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- John Brew, Chief Executive, State Transit Authority of NSW
- Jim Walshe, O.A.M., Secretary, Australian Railways Union (NSW Branch);
National Vice President, Australian Railways Union;
Vice President, Labor Council of NSW
- Robin Read, Acting Commissioner, Queensland Railways
- Michael C. G. Schrader, Executive Director, Railways of Australia (Services) Pty Ltd
- The Hon. Warren Snowdon,
Parliamentary Secretary to the Minister for Transport and Communications
- Gareth Grainger, General Manager—Group Commercial Services,
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NETWORK

THE RAILWAYS OF AUSTRALIA QUARTERLY

Volume 27, Number 4
October, November, December 1990



COVER: The magnificent sight of a heavily-laden coal train running neck-and-neck with a bulk grain wheat train as they wind along parallel track heading for their separate export terminals. Video speed control for trains at bulk loading and unloading facilities is featured in this edition along with the introduction of the Australian RoadRailer and other exciting innovations in freight for manufacturers.

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(Source: "N.E.C. Maintenance: Machines That Make a Difference", *Railway Age*, May 1989).

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Source: "Stabilizer Turns Weeks to Hours for Fast Restart", *New Civil Engineer*, October 1987).

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(Source: "BN and AMTRAK Vibrate Their Track", *Progressive Railroading* September 1987).

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The Target Freight Market

Placing the needs of the Australian freight market first, and then designing a rail service to meet them, is the marketing strategy of National Freight Co-ordinator, Jack Harris, and there is no doubting its success. The figures prove that.

"We look for a target freight market and design a rail service specifically to suit it," he says.

"The service commences irrespective of utilised capacity. We then market the service to fill the capacity, and when it is filled we start again."

"The old strategy was to run trains when filled by existing demand. This was operations orientated. Now, we put the market first."

A recent example of the success of the new market strategy is the automotive industry train from Melbourne to Sydney. Despite the economic downturn, rail has commenced a fixed consist unit automotive train overnight to Sydney.

"This meets the market requirements. We will demonstrate the service, show that rail can perform, then gain greater market share. Similarly our Melbourne-Brisbane service has been upgraded," says Mr Harris.

On the East Coast of Australia (the shorter routes) the concept envisages more unit trains, point-to-point

NETWORK

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PROUDLY PRINTED IN AUSTRALIA

TRACKS

Jack Harris
National Freight Co-ordinator



running, no shunting, intermodal service, and trains which can be maintained without breaking the consist as far as possible. To the West of the continent the same principles apply, although blocks of traffic are joined to gain train lengths of up to two kilometres.

"We have now applied this concept across several markets for Term Hire trains (full trains hired by TNT and Intermodal, for example), Superfreighter trains for general industrial freight, Linertrains for shipping container exports/imports, and now unit trains for the automotive industry," says Mr Harris.

"The unit shipping container Linertrains are significant in Australian transport in allowing ships to reduce the number of ports-of-call around the coast."

"We have created services that customers need, promoted them in the target market, and then reaped the benefits."

What are the benefits?

Well, interstate rail freight in 1989/90 reached 9.1 million tonnes, the second time it has exceeded nine million tonnes. For the first time,

containerised freight exceeded 60 per cent reaching 62 per cent in May/June 1990.

The figures reflect the reorganisation of interstate freight, and the success of rail's marketing and operating strategy.

In 1987/88, interstate rail handled 8.2 million tonnes, of which 45 per cent was intermodal container freight. On the East Coast (Melbourne, Adelaide, Sydney, Brisbane) 58 per cent of the containers moved on unit trains.

Two years later (1989/90) the total freight moved by rail was 9.1 million tonnes, 60 per cent of it containerised with 71 per cent of the East Coast containers on unit trains.

"The benefits show in the market segment results because rail's growth has been in these areas. Moreover, it has simplified the management task. Interstate rail is now 62 per cent containerised freight and 25 per cent steel movements — that is a neat, manageable business," Mr Harris added.

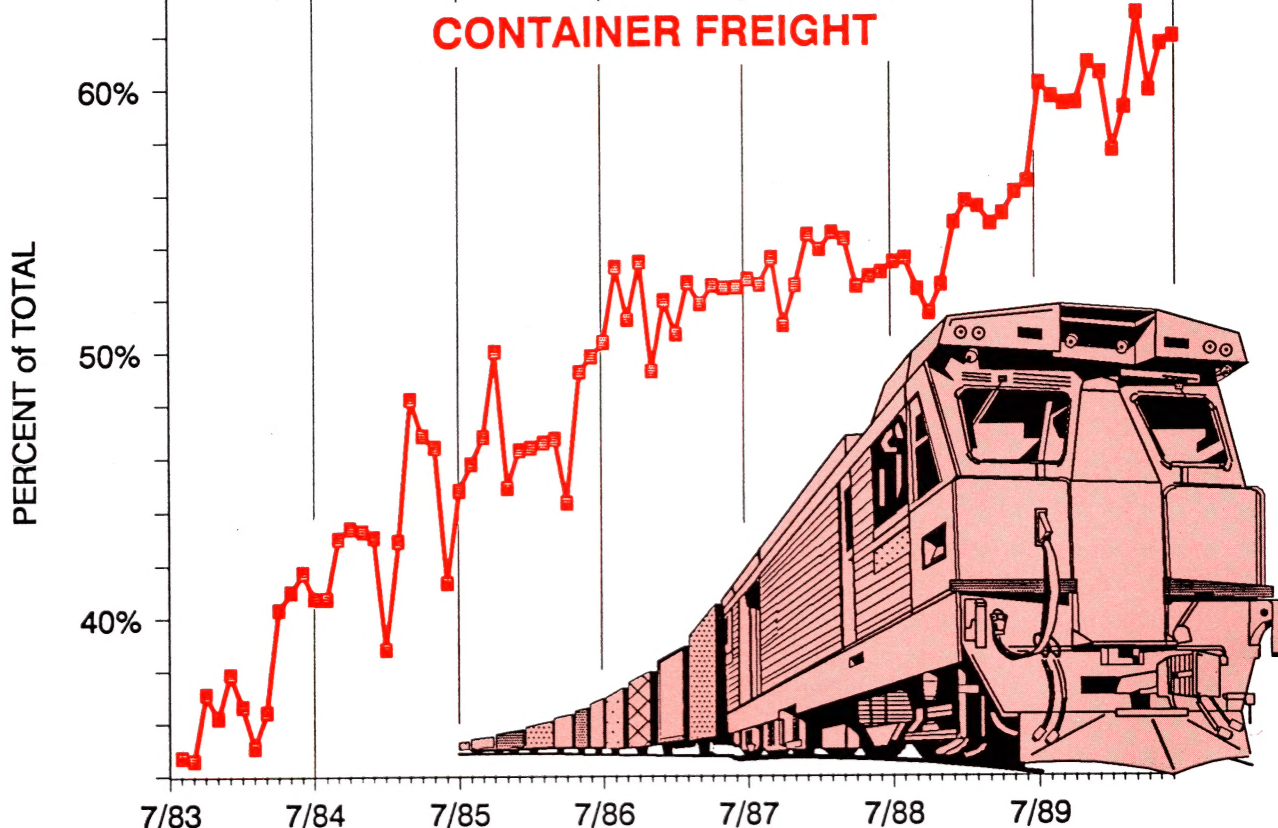
The economic downturn has sharpened rail's competitive edge. Rail

suffered a drop of less than two per cent in 1989/90 compared with 1988/89. Research shows that rail thus gained market share, since total freight movements have fallen more significantly.

Many manufacturers previously using only road transport are now spreading their risk by moving at least 20-30 per cent of their freight to rail. Many road transport companies are responding by providing both road and rail options for their clients.

"Rail will continue to design interstate services to appeal to more target market sectors. Rail is well positioned for this economic crisis," stated Mr Harris. "Rail will earn market share through more effective market service — to the benefit of the Australian nation." □

JULY 83 TO JUNE 90



TRACKS

How grease on rails saves money



THE TRIBOMETER UNDERGOES TRACK TRIALS AT BURNLEY ON MELBOURNE'S EASTSIDE. WITH ITS HELP THE VICTORIAN PUBLIC TRANSPORT CORPORATION ESTIMATES SAVINGS OF APPROXIMATELY \$500,000 A YEAR.

Picture (from left) Railways of Australia's engineering research manager, Cliff Simmons, with Victorian PTC staff Peter White, Laurence Gaffney, Seth Ravindran, Rod Fuller, and Peter de Bruyn operating the Tribometer.

The scientific application of grease to railway track can reduce wear and save fuel. How much grease is just right for the rail surface is calculated with the help of a tribometer.

This is a machine which measures the co-efficient of friction on any given length of rail.

One was imported from the United States of America and tested near Burnley four kilometres east of Melbourne's busy Flinders Street Station recently. It was the first one to be sold outside the USA.

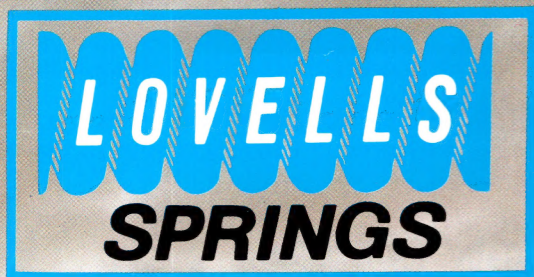
The tribometer is being used to help quantify results of a rail lubrication study being carried out by Railways of Australia (ROA). Victoria's Public Transport Corporation (PTC) is co-operating in the study.

During the past few years the on-going study has produced some interesting findings. PTC manager of maintenance engineering, Denis Lyon, said:

"At first we thought savings would come mainly from preventing rail-wear on curves, but tests have shown that there are also very significant fuel savings to be made. In New South Wales where extensive testing has been done, the figures indicate a 10 per cent saving on fuel.

"On that basis we could expect to save around half a million dollars a year, if rail lubrication was introduced in Victoria."

Lubricating curves with fixed trackside greasers has been standard practice for many years, but to extend this to a network-wide basis, consideration is being given to the introduction of vehicle-mounted lubricators.



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TRACKS



Top: Denis Lyon and Greg Johnston of the Victorian Public Transport Corporation check the application of grease to a curved section of track near Ararat.

Lower: A fine adjustment is made to the nozzle which automatically delivers the grease from the lubricating vehicle to the rail surface.



At Ararat, Victoria, a Hi-rail track inspection vehicle has been fitted with special equipment to squirt a fine bead of grease onto the part of the rail known as the gauge face.

This is where the wheel flanges of rolling stock come into contact with the rail. It's very important that the grease is applied only here, and not on the head of the rail – otherwise locomotives would lose traction.

If correctly applied, rail grease lowers the friction between rail and the wheels of a train, resulting in less fuel being needed to haul the train along. The extent of the savings will be known soon, after tests are carried out on lubricated rails between Ararat and Portland. □

TRACKS

FROM ROAD

(and vice versa)



SET TO REVOLUTIONISE LONG-DISTANCE FREIGHT HAULS THE AUSTRALIAN-BUILT ROADRAILER (TOP) HAS ITS WHEELS ALOFT FOR RAIL TRANSIT BUT IN MINUTES CAN CONVERT TO A ROAD VEHICLE PULLED BY A PRIME MOVER. HEADING SOUTH TO ADELAIDE AT THE END OF SIX MONTHS' TRIAL RUNNING TO ALICE SPRINGS AND BACK (RIGHT) THE ROADRAILER HAS PROVED ITS WORTH. ON ONE TRIP A GLASS OF WATER PLACED ON THE FLOOR IN THE CENTRE OF A ROADRAILER DID NOT SPILL A DROP, ACCORDING TO AUSTRALIAN NATIONAL RAIL.

The RoadRailer, a semi-trailer road vehicle which quickly and easily converts to rail track operation has been introduced in Australia. It is particularly suited to long-distance haulage and offers the dual advantages of both road and rail transport.

About \$2.5 million has been spent developing the RoadRailer which is based on an American-designed system. Australian National Railways has exclusive rights to make, market and operate the system in Australia.

RoadRailers are being custom built in Victoria and will be either sold or leased to transport companies. AN is negotiating with all State rail authorities with a view to operating the system Australia-wide.

Loaded at the customer's factory or forwarding depot, the customer or contractor's own prime mover hauls the trailer to a RoadRailer depot.

Two men, one of them the truck driver, convert the vehicle to rail track operation in less than five minutes.

The air-bag suspension of the RoadRailer itself raises the trailer body. The road wheels slide forward. The rail bogie is wheeled into place and the trailer's suspension is lowered. The road wheels remain clear of the rails.

The process continues as fast as trailers are delivered. A train is made up in a matter of minutes. And at the end of the journey, break up is just as fast: the first trailers are ready to leave the RoadRailer yard within minutes of the train's arrival.

The RoadRailer train, 50 to 100 vehicles long, is unlike any freight train in the history of Australian railways.

The RoadRailer coupling system built into each vehicle joins trailer to trailer in a rigid yet flexible unit, and the train itself moves smoothly as one unit.

ROAD TO RAIL IN MINUTES



A RoadRailer trailer has a tare weight about half that of a conventional railway freight wagon, which means the hauled load is more payload than deadweight. This yields substantial savings in locomotive power and fuel use.

The close coupling of trailer units (their bodies are about 25 cm apart) offers total security. Once coupled, trailer doors cannot be opened. Close coupling reduces wind resistance, with resultant fuel economies.

AN is testing RoadRailer at speeds up to 140 km/h. Regular operations are at 120 km/h. Even at such high speeds, wear and tear on customers' trailers is negligible. Costly components such as tyres and suspensions are not used at all: the rail bogie does all the long haul work.

An extensive six-month trial of the system on the Adelaide-Alice Springs line proved its worth. ▶



TRACKS

Managing Director of Australian National, Mr Russell King, says: "With national freight movements expected to double over the next decade and with mounting public concern over large trucks on our highways, RoadRailer is an obvious answer.

"Transport authorities worldwide are realising the advantages of fully utilising rail networks for moving freight. Here we have the leading edge of rail technology and the ultimate in low-cost and efficient haulage.

"Many of AN's major customers realise the advantages and have shown keen interest in acquiring the vehicles," he said. "Complete RoadRailer trains will be operating within a year."

AN plans to have about 100 trailers and pantechnicons in service by next August and proposes to produce RoadRailer tippers, tankers and refrigerated vans as well.

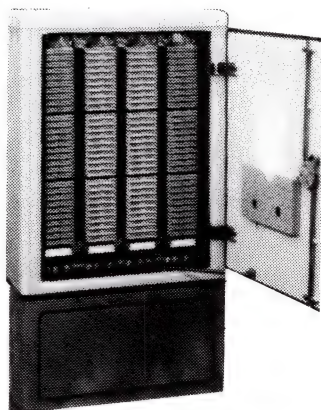


A RoadRailer (based on dry goods pantechnicon) has a tare mass of 9.0t on the road (14.35t on rail) and a gross mass of 35.t on road (40.35t on rail). Its payload mass is 26.0t. Its length is 12.5 metres, width 2.5 metres, height 4.3 metres above road surface. □

Wheels for rail, wheels for road alternating along the track as the RoadRailer train fulfils its contract in the new door-to-door service.

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New underground planned for Sydney's west

THE UNDERGROUND RAIL SERVICE CARRYING HUNDREDS OF THOUSANDS OF PEOPLE DAILY TO SYDNEY'S CENTRAL BUSINESS DISTRICT HIGH-RISE OFFICES IS DESTINED FOR A MAJOR EXTENSION ALONG THE CITY'S WEST SIDE IF A PLAN FOR A NEW LINE MEETS GENERAL APPROVAL. CONCEIVED ALMOST BY ACCIDENT, METROWEST, AS THE PROJECT IS NAMED IS NOW SUBJECT TO A TWO-YEAR FEASIBILITY STUDY. IT BOLDLY ENVISAGES THE MORE EFFECTIVE USE OF EXISTING SPACE AND FACILITIES WHICH HAVE BEEN UNDER-UTILISED FOR YEARS. PROJECTIONS OF CHANGE IN THE DEMOGRAPHY OF THOSE AREAS TO BENEFIT MOST FROM THE PROPOSED NEW LINE SUGGEST IT IS A TIMELY SCHEME DESIGNED TO COPE WITH THE NEED TO MOVE MUCH LARGER NUMBERS OF PEOPLE IN THE YEARS AHEAD.

The largest underground rail development in more than a decade is envisaged for Sydney in a concept drawn up by CityRail planning department engineers, track design specialists, and commercial operation planners. It is now the subject of a two-year feasibility study.

CityRail is an integral part of the transport connections for metropolitan New South Wales. Each week day it carries 800,000 passengers on 2,000 services over 1,700 kilometres of track to destinations as far north as Newcastle, to Wollongong in the south, and to the Blue Mountains in the west.

At current rates of city growth, CityRail will need to service Sydney's central business district with an additional 16 trains per hour during peak periods within the current decade.

Track congestion in the corridor between Redfern and the CBD already limits ability to bring passengers into the city and through to destinations north of the Harbour Bridge. This restriction also prevents provision of additional services to connect outlying suburbs with the city.

The new MetroWest plan involves:

- ☐ Building a new underground rail line west of the city, from Redfern to Wynyard.
- ☐ Construction of a new underground station in the Haymarket area to service Sydney's rapidly expanding business area and Chinatown.
- ☐ A second new underground station near Market Street to provide easier access to Darling Harbour, new commercial developments and attractions such as the aquarium.
- ☐ A MetroWest underground station at Central Station, and a re-modelled Wynyard interchange.



TRACKS

PRIVATE FUNDING WOULD BE ENCOURAGED IN THE ESTIMATED \$350 MILLION PROJECT

Preliminary estimates for a proposed MetroWest link are in the order of \$350 million not including the cost of stations. Private funding and participation in the project would be encouraged. Additional offsets may be gained by the disposal of surplus land.

The MetroWest link, if feasible, would provide rail access where it is most needed in fast-growing areas of Sydney. New commuters could take advantage of the greater choice in CBD stations and the freedom to avoid crowded roads in their journey to work by car.

No change at Redfern or Central

For existing CityRail passengers, the new rail link would eliminate the need for up to 8,000 InterCity commuters to change trains at Central or Redfern each day. This would relieve the problem of absorbing InterCity commuters into crowded suburban trains during the morning peak. Much of the congestion presently occurring at Central would disappear.

CityRail planners believe new stations near Haymarket and Market Streets will reduce some of the pressure being experienced at Town Hall and Central.

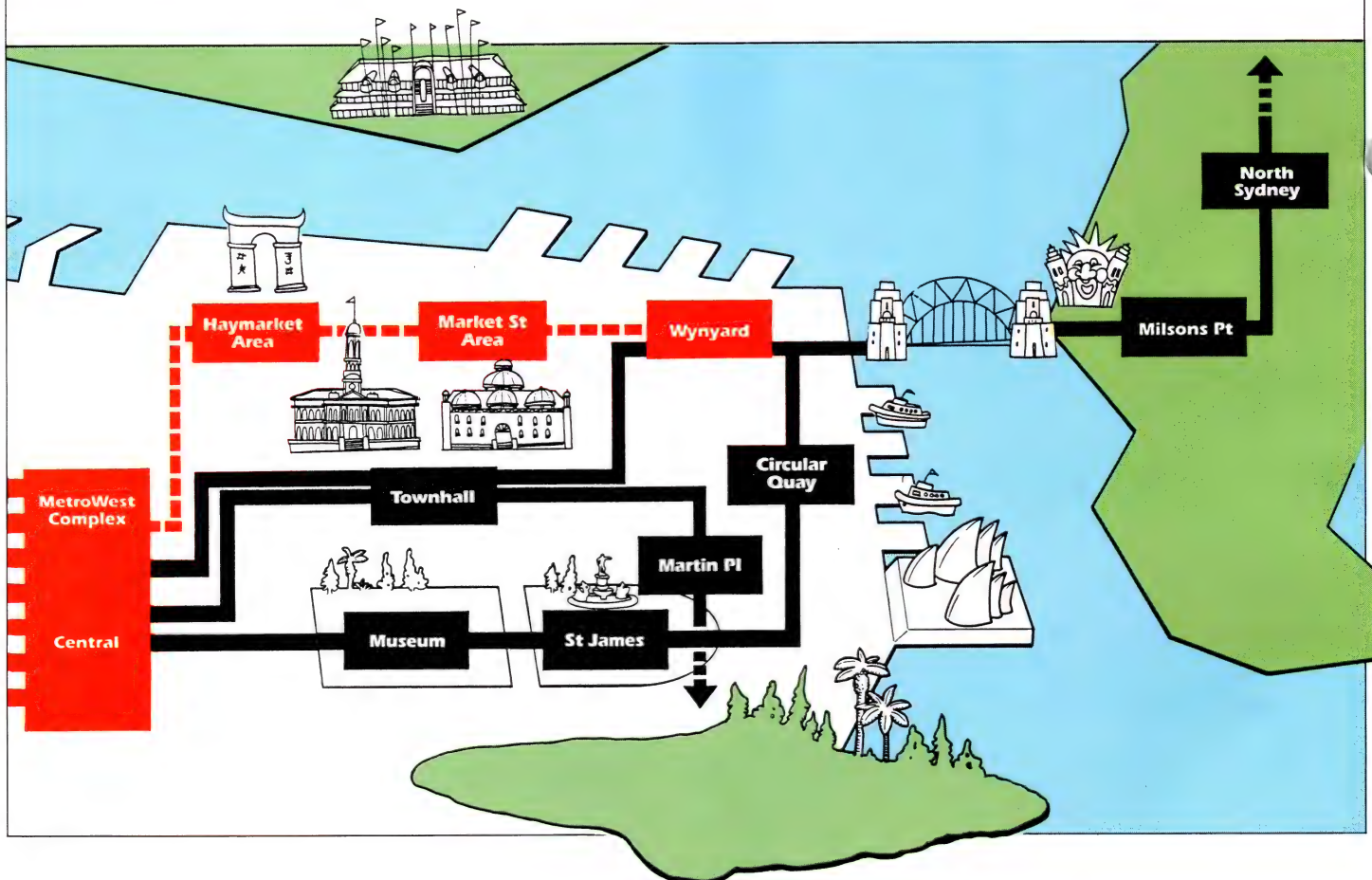
MetroWest, if feasible, would run along the western side of the city between Redfern and Wynyard. It would include a new rail complex at Central, new underground stations near Haymarket and Market Streets, and terminate at Wynyard.

Trains from the Blue Mountains, Campbelltown, Hornsby, Penrith, and the Central and South Coast will service this new link in the rail system.

A MetroWest link would raise the capacity of the underground network by between 12 and 20 trains per hour, in both directions, during the morning and evening peaks. It could also relieve most of the peak period pressure on Central and Town Hall and free up growing congestion throughout the entire CityRail system.

Using MetroWest, InterCity passengers would have direct access to the heart of the CBD. InterCity trains are currently too long to use Sydney's underground stations. It is proposed these problems will be eliminated using special purpose built platforms. MetroWest platforms would be of sufficient length to accommodate InterCity as well as suburban trains.

The through operation of the InterCity services to the CBD averts the need for providing a dedicated InterCity terminal at Central or Redfern. A MetroWest link would service as many as eight InterCity trains per hour in the morning and evening peaks, and an equal number of fast suburban services.





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TRACKS

‘So we drew a few red lines on the map . . . Suddenly it became obvious that MetroWest could become the answer to future public transport needs in Sydney’s central business district.’

The proposed new underground station near Haymarket, close to Sussex Street, would be just one block away from the World Square development. Nearby is the southern end of Darling Harbour including the Exhibition Centre, Chinese Gardens, Entertainment Centre and Ultimo. The proposed MetroWest link would terminate at Wynyard where passengers can transfer to North Shore and City Circle trains.

Wynyard station would need to be re-modelled to ensure rapid turnaround of trains and efficient interchange of passengers.

Project team members

One of the senior members of the CityRail planning department team is mechanical engineer Col Hunter, who began his career as an engineering trainee with State Rail in 1968, and who has worked in strategic planning areas for the past 10 years.

Other team members are Greg Beasley, track design specialist, Frank Golotta, a strategic planner with an engineering background, former Operations Branch planner Tony Giles, quantity surveyor Rob Peterson and operations specialist Tony Swift.

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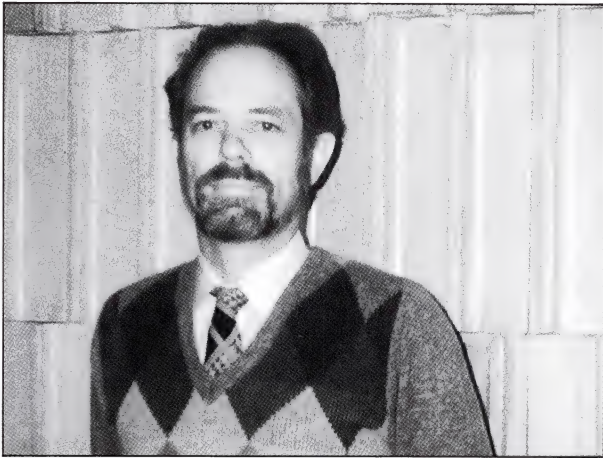


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Mechanical engineer, Col Hunter, has worked in rail strategic planning areas for the past 10 years.



Mechanical engineer, Col Hunter, has worked in rail strategic planning areas for the past ten years.

The group is responsible to Acting Planning Manager Peter Siapos, who officially named the project MetroWest.

While the team was carrying out its studies it looked at two former tram tunnels at Wynyard, currently used as a car park, two platforms at St. James Station, which, Col Hunter said "are not doing anything," similarly another two at Central Station, and under-utilised resources at Redfern, where the two main lines only serve Sydney terminal.

"So we drew a few red lines on the map," he said.

"At the same time, other members of the planning department had identified an urgent need to create more capacity within the system to cope with the growth of Sydney's population.

"Liaising with this group, we were asked for a 'word-picture' to include with plans for future development.

"Suddenly it became obvious that MetroWest could become the answer to future public transport needs in Sydney's central business district," he said.

Central business district to grow

The majority of Sydney rail commuters travel to and from their place of work and predominantly to the central business district. This journey pattern of necessity leads to quite special transport and planning considerations.

The Sydney CBD continues to grow rapidly. Commercial development in the north and south west areas of the city will help CBD employment to increase by up to 15 per cent during the next decade. Employment on the Lower North Shore alone is predicted to grow 20 per cent by 1993.

As well as CityRail's existing passenger catchment areas, the Department of Planning has earmarked South Creek, Rouse Hill/Kellyville and Glenmore Park as centres for major residential development.

While a proportion of those who move to these new areas will seek local employment, history shows that many will commute to Sydney to enjoy wider employment opportunities and better salaries and conditions.

Accordingly, CityRail is working quickly to establish the engineering feasibility of MetroWest. It is liaising with various organisations to ensure the project complements other transport developments including plans by the Roads and Traffic Authority for a road tunnel under Park Street.

If the MetroWest feasibility study is positive, CityRail would initiate a design and development program which complies with planning and environmental requirements to ensure the project is compatible with the strategic development of Sydney.

To relieve strain on the existing underground system and to cater for new demand, Sydney needs a solution: one possible solution is CityRail's MetroWest project. □

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FUJITSU

Rail's *HIGH* to pollution of

PROTECTION OF THE ENVIRONMENT IS AN ISSUE OF GROWING CONCERN FOR ALL AUSTRALIANS.

RAIL TRANSPORT'S POTENTIAL TO FILL THE INCREASING NEED FOR A FAST, ENVIRONMENTALLY FRIENDLY MEANS OF TRAVEL STILL REMAINS TO BE FULLY EXPLOITED, SAYS

STEFAN NILSSON.

HE IS VICE PRESIDENT OF ASEA BROWN BOVERI (ABB) TRANSPORTATION IN MANNHEIM, GERMANY.

STEFAN OBTAINED HIS MSc DEGREE FROM CHALMERS UNIVERSITY, STOCKHOLM, IN 1970 AND HAS HAD CONSIDERABLE EXPERIENCE IN ELECTRONIC ENGINEERING AND IN OTHER MAJOR INDUSTRIES WORLDWIDE.

ABB TRANSPORTATION, MANNHEIM, IS A CO-ORDINATING CENTRE FOR HIGH-SPEED TRAIN SYSTEMS IN BUSINESS SECTOR TRANSPORTATION.

Train travel offers unique opportunities for the profitable use of journey time whether for work, conferences, socialising or for relaxation. Inter-city high speed train services are becoming an increasingly attractive complement to other modes of travel. And most operate right into the city centres.

High maximum speeds and sophisticated bogie design are some of the tools used to reduce journey time. In recent years the development of the rail/wheel technology has provided new opportunities believed to be impossible not too long ago.

Train concepts such as the German ICE train, designed for commercial use have been run at high speeds over 400km/h. The Swedish High Speed Train proves that travelling times can be reduced by 25 per cent without modifications to the existing track.

The technical fields that make this possible are mainly:

- ☐ *Bogies.* Stable run at high speeds, lower maintenance requirements and lower track forces are the critical issues.
- ☐ *Asynchronous traction motor drive.* Here the benefits are low weight and thereby low track forces, low motor maintenance and reduced energy consumption.
- ☐ *Active carbody tilting.* The systems of today have reliable, proven function and offer significant time savings. With the newest design there is not even any infringement of the equipment into the passenger area.

Travelling conditions are never the same, and vary from place to place. Some general aspects here can, however, serve to show how different train concepts suit different traffic situations. What counts in the end is travelling time and cost.

***SPEED* answer the environment**

On very high speed systems the maximum speed of 300-400km/h on very high quality, dedicated tracks reduces travelling time considerably. In areas of medium population density the cost of upgrading or building a new, high standard track is often justified by the need to increase the standard and capacity irrespective of the introduction of very high speed trains.

In this way the additional costs attributable to the system can be justified where the distance between terminal stations is some 100km or more.

Where tilting trains are used, the maximum speed is less relevant and is normally less than 250km/h although this is not a technical limitation of the rolling stock.


In areas of low population density financial aspects normally prevented building new or upgraded track systems. Areas with very high population have limited possibilities in routing straight, high standard tracks because of the existing infrastructure. By introducing tilting trains, shorter travelling times (often about 25 per cent shorter) are achieved without any modifications to existing infrastructure other than adjusting the signalling system.

Choosing the rolling stock alternative is of course much more than choosing between maximum speed and tilting function. All matters related to potential service such as station intervals, dwelling times, and so on, must be considered, and Asea Brown Boveri possess all the expertise needed for the study of this as well as for the integral electrical and mechanical design of the rolling stock.

Examples of high speed rail technology and the contribution given by ABB to European rail systems can be shown from the following.

High speed train X2, Sweden

A total train concept has been developed entirely by ABB and represents advanced technology in

several fields. Twenty train sets are being delivered for the service between Stockholm and Gothenberg, where they will reduce the travelling time by about 25 per cent. The first complete train set was on track in July 1989 and has proved to fulfil all the specifications in the extensive running tests that have been carried out. It was ready for commercial service when it was delivered to the Swedish State Railways in December 1989. 

LARGER PAYLOAD

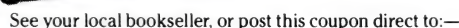
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TRACKS

An option has been placed for 32 additional trains intended for use on other Swedish routes, where the same time savings will be achieved.

Extensive development programs and prototype testing of all vital systems have resulted in a product of proven design and of very high standard.

Higher curving speeds

The most interesting features introduced by the new train are:

- ☐ Radial Steering Bogies, to permit 30-40 per cent higher curving speeds without reducing safety margins or increasing the wear rate of wheels and rail. The suspension is optimised to give a smooth ride even on a track which is not perfect.
- ☐ Asynchronous motors and GTO thyristor control, to reduce unsprung masses and minimise maintenance, and
- ☐ Active tilt system, to reduce the lateral forces experienced by passengers at high curving speeds.

The train concept uses other advanced technologies, too, such as integrated computer control of traction tilting and train functions, passenger information system, air conditioning, automatic doors, public telephone and low noise design.

The carbodies are made of stainless steel and the entire train has a careful aerodynamic design, all giving it a powerful impression.

A large degree of flexibility is achieved with the concept power unit plus trailing cars. The train can be made shorter or longer by varying the number of cars and power units. This will naturally influence the train's performance.

The key data of the X2 train in its basic concept are:

Train configuration	1 power car, 5 coaches (incl. driving trailer)
Maximum speed	210km/h
Number of seats	1st class: 102; 2nd class: 152
Overall length	140m
Track gauge	1435mm
Line voltage	15kV, 16⅔Hz
Rated power	3260kW per power head
Propulsion	AC asynchronous motors/GTO thyristor inverter. Regenerative braking
Carbody material	Stainless steel

At present the European railways have by far a much larger domestic passenger flow than international passenger movement. For this reason, the first European high speed projects use new or upgraded domestic lines. The objective is, however, to gradually interconnect these lines to a large European network.

German network speeds up

Based on the successful prototype, which has been run at speeds over 400km/h, the German Federal Railways, DB, have ordered 41 ICE (InterCity Express) train sets with an option for 19 additional sets. And the 2000km German network to be completed by the end of the 1990s will require even more trains.

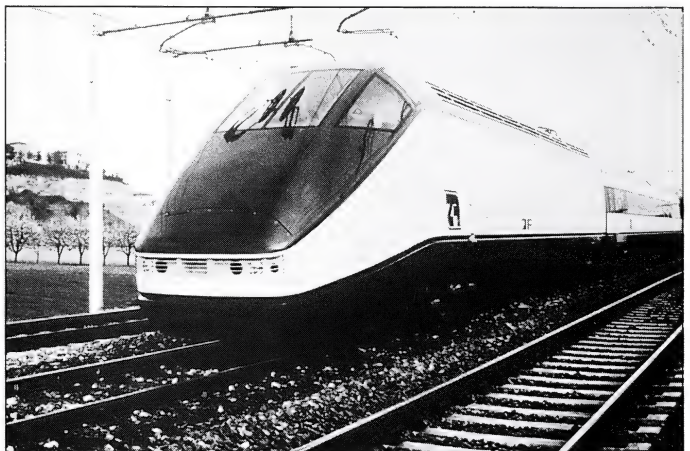
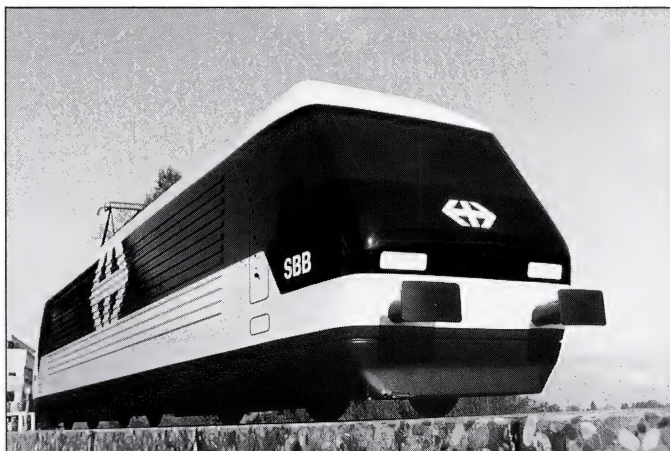
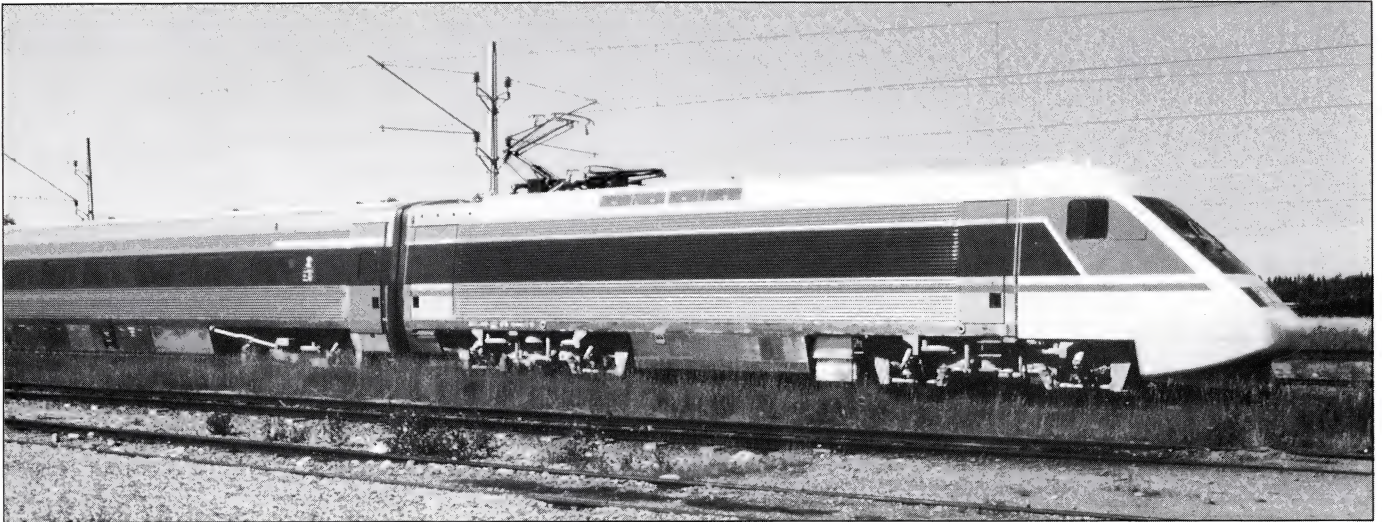
The series trains will have variable formation with two power heads and up to 14 intermediate coaches. In certain formations they will operate at speeds of up to 280 or possibly 300km/h.

The rolling stock is of very high technical standard and ABB has contributed to this success by developing new electrical gear and part of the mechanical equipment for the running prototype train and the contract for the 41 series trains.

The first German lines to have an ICE service are the newly built north-south line, Hannover to Wurzburg line, and the Mannheim-Stuttgart line. Commercial service will open in summer 1991.

For all environmentally conscious countries with high standards of living the high-speed rail alternative offers a potential to move large volumes of freight and large numbers of people quickly and efficiently with little environmental impact. □

The high-speed trains of Europe can rush people from city to city at up to 400 km/h. From left (bottom row) Germany's ICE model, the X2 Swedish engine, Switzerland's 2000, and (below) the ETR 500 Italian speedster.



TRACKS

CSIRO's Fintrain evaluates performance

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia has developed a computer program model which evaluates the performance of rail projects, as well as associated risks.

Called FinTrain it is dedicated to a specific project, but could be adapted to suit a number of applications.

As part of its evaluation process, FinTrain looks at internal rates of return, cash flows – and debt cover ratios in which the banks are particularly interested when it comes to lending money.

A number of variables are included, such as design options,

the length of the construction period, how the construction costs would vary over that period, market demands, interest rates, depreciation rates, debt/equity ratios, expected revenues, expected maintenance costs and other incidentals, such as refurbishing the trains and any additional trains which may be required.

It can also consider a project to be divided into stages with revenues from each stage and the effects of this on financial performance.

Sensitivity analyses assess vulnerability to changes in various market, design, construction or external factors.

Risk analysis helps assess the probable distribution of financial outcomes, being particularly useful for identifying probability of success.

The model can evaluate various design, construction operating, market and financial options and has shown that division of a project into stages with revenues from each stage can substantially increase debt cover ratios in some cases. It can also evaluate new technologies such as maglev (magnetic levitation).

Enquiries: Dr Selwyn Tucker, CSIRO Division of Building, Construction and Engineering, PO Box 56, Highett, Victoria, Australia 3190. Telephone (03) 556 2277 or (03) 556 2211.

Light rail vehicles becoming popular

Light rail vehicles are gaining popularity in Australia and in many other parts of the world. The Transport Authority in Zurich, Switzerland, has just ordered 23 of these newly-designed articulated light rail vehicles for service about the middle of next year.

The new rolling stock will be equipped with an advanced electric drive system supplied by ABB Transportation System Ltd.

Key components of this more powerful drive system are the GTO-equipped power inverter, directly supplied from the catenary, and the asynchronous motors. As a further innovation the new cars also feature a regenerative brake.

The power generated in braking is fed back into the catenary supply system, and this considerably reduces overall energy consumption.





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Australian double-decker lures buyers from Denmark

Strong Danish Interest in Goninan and Co's Tangara

A report in the Danish newspaper *Politiken* suggests strong buying interest by the Danish State Railways in the Australian-designed and built Tangara double-deck commuter rail vehicle made by Goninan and Co.

Early discussions are understood to have centred around the possible purchase of 290 Tangara cars or between 70 and 80 sets.

The *Politiken* report read as follows:

Danish State Railways (DSB) travelled down under to Sydney, Australia, to find a replacement for the old red S-trains in Copenhagen which transport 325,000 passengers per day.

The Australian train is a double-deck vehicle and has more than twice the capacity of the twelve 23-year-old S-trains which do not live up to current service demands. The DSB management will make a decision after the summer holidays.

S-train passengers in the metropolitan area will be riding in Australian-developed double-deck S-trains, if DSB management follows the recommendation by the S-train division.

"For several months we have been investigating the market and to us there is no doubt that the double-deck train with its increased capacity is providing the best service and that the Australian train is the best solution," says S-train Manager Erik Maglehøj.

A French double-deck train has also been in the picture, and has even been tested in the Danish metropolitan service, though as a regional train and not as an S-train.

"We prefer the Australian vehicle because like the present S-train it is produced in four car sets and is the same length. Therefore, it adapts easily to our platforms," says the S-train Manager.

The Australian train has twice the capacity. In a coupled four-car set, the length of a standard S-train, there are 900 seats and standing room for 1100 whereas in the present DSB S-trains there are 500 seats and standing room for 300. In addition the Australian S-train has more space for bicycles and prams.

The Australian train also matches the existing overhead wires which supply the train with electricity for the engines. The fact it has room for an extra



Australia's Tangara has strong appeal for Danish State Railways because it makes the maximum use of space between the rail and overhead electric line, and would fit easily into Denmark's existing system.

deck, is simply because of a better usage of the space between the rails and the overhead wires.

In the DSB budget agreement for 1992 there is Dkk 50 million (A\$10.6m.) for purchasing new rolling stock and in 1993 Dkk 300 million (A\$63.6m.). In 1992 at the earliest DSB will place an order with successive deliveries beginning one year later. □



Five-fold increase in rail's exports in past five years

The Australian Trade Commission (Austrade) and the Australian Railway Industry Committee (ARIC) were granted observer status at the 13th ASEAN Railway General Managers' Conference recently in Jakarta.

Austrade and ARIC have targeted the ASEAN region as a key market for Australian railway products and services. Thailand, Indonesia and Malaysia are all upgrading their railways from former third-world standards to state-of-the-art systems and management practices.

The Australian railway industry has an annual turnover of \$1 billion and offers a comprehensive range of equipment and construction and consultancy services. Annual exports have grown from \$9 million in 1985 to \$50 million this year.

Mr Barry Renaud, Austrade's Manager, Railways, and Mr Warren Princehorn, ARIC's Chairman, presented a paper to the conference; conducted a seminar; and mounted an exhibition of Australian capabilities.

Their attendance reinforced and highlighted the Australian railway industry's commitment to the region. The conference was an important venue for an exchange of views and experience, and encouraged collaboration in the transfer of technology.

Austrade in recent months has arranged visits to Australia by ASEAN government ministers and high-ranking railway officials to demonstrate Australia's geographic proximity and the industry's development of expertise and products under similarly severe climatic and topographic conditions. □

TRACKS



RAIL POWER IN THE WEST

Western Australia's new EMU class electric railcars (top) for the Perth suburban service.

Lower: Transport Minister Pam Beggs switches power to the Perth-Armadale line inaugurating the first electrified passenger service in the state while Westrail manager (power and overhead) Andy Long watches.



Switching on power to Western Australia's first electrified passenger railway line recently marked another milestone in one of the biggest transport modernisation and expansion projects undertaken by a Western Australian Government.

Transport Minister Pam Beggs switched the electricity on at a ceremony at Westrail's Claisebrook substation which will provide all the power for the suburban passenger rail system.

The substation takes 132,000 volts from the SECWA's

switchyard at East Perth through two independent supplies.

Westrail's substation transforms the power to the 25,000 volts needed to operate the electric trains. This power is fed to the overhead wires through an adjacent feeder station which contains the switchgear to control and distribute the electricity.

The railcars, which operate in two-car sets at speeds up to 90 kmh on the Armadale, Fremantle and Midland lines, were built at Maryborough in Queensland. □

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New

much simpler and easier to read

Safety Rules

The most thorough overhaul of safe working rules and regulations in the 135-year history of the railways in New South Wales is being carried out by a special project team representing staff, management, the State Rail Safeworking section, and the trade unions.

The outcome will be a series of easy to read and understand manuals replacing the present bulky complex

book of rules and regulations and its general appendices.

The massive task of reviewing and transforming the old documents is led by project manager Rosane Dunn. She said research conducted by the operations staff had shown employees were finding the existing books difficult to manage and even difficult to carry.

"They are cumbersome, out-of-date and hopelessly jumbled," she said. "They have just been added to over the years, without any thought of structure.

"This makes the rules difficult to look up.

"Following our research the team decided safeworking regulations should be written as procedures rather than rules," she said.

The information is being divided into separate procedural manuals to make the information easier to find; the new manuals will be in loose-leaf format so they can be easily amended.

The project team has completed the re-write of the first manual, Track Block and Automatic (TBA).

During the next few months the old safeworking documents will be culled to take out unnecessary information, reviewed, reorganised and rewritten into new manuals. There will be other manuals for each of the following:

- ☐ Basic Safeworking
- ☐ Centralised Traffic Control (CTC)
- ☐ Block Telegraph
- ☐ Staff and Ticket
- ☐ Electric Staff
- ☐ Emergency Procedures
- ☐ Engineering Worksite Protection.

Twelve safeworking operations staff were seconded to write the first manual. Each reviewed and rewrote a section.

"Staff know the work best and are best qualified to review and advise on the procedures," Rosane Dunn said.

"We completed our first manual in just two weeks, thanks in great part to the help of plain English trainers, Rob McGregor and Tony Golsby-Smith.

"They showed the project team how to cull and reorganise the original material into new sections, rewrite it into simple, clear procedures and edit the rewritten material."

Next on the list for the team's rewrite is the Basic Safeworking manual (incorporating Basic Signalling and Shunting). This will be followed by the rewrite of the CTC manual. □

The special project team which is revising safety rules and regulations.

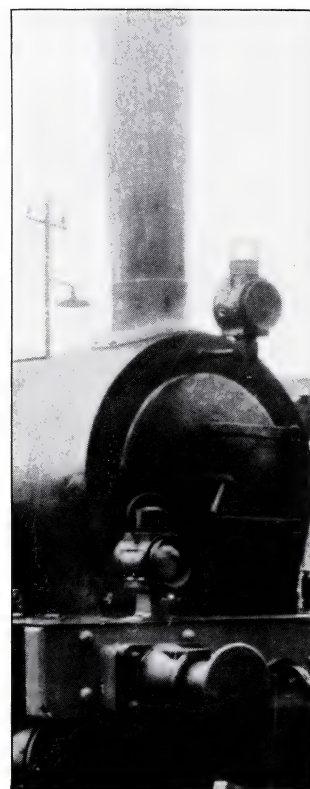


QUEENSLAND'S 125 YEARS OF RAIL

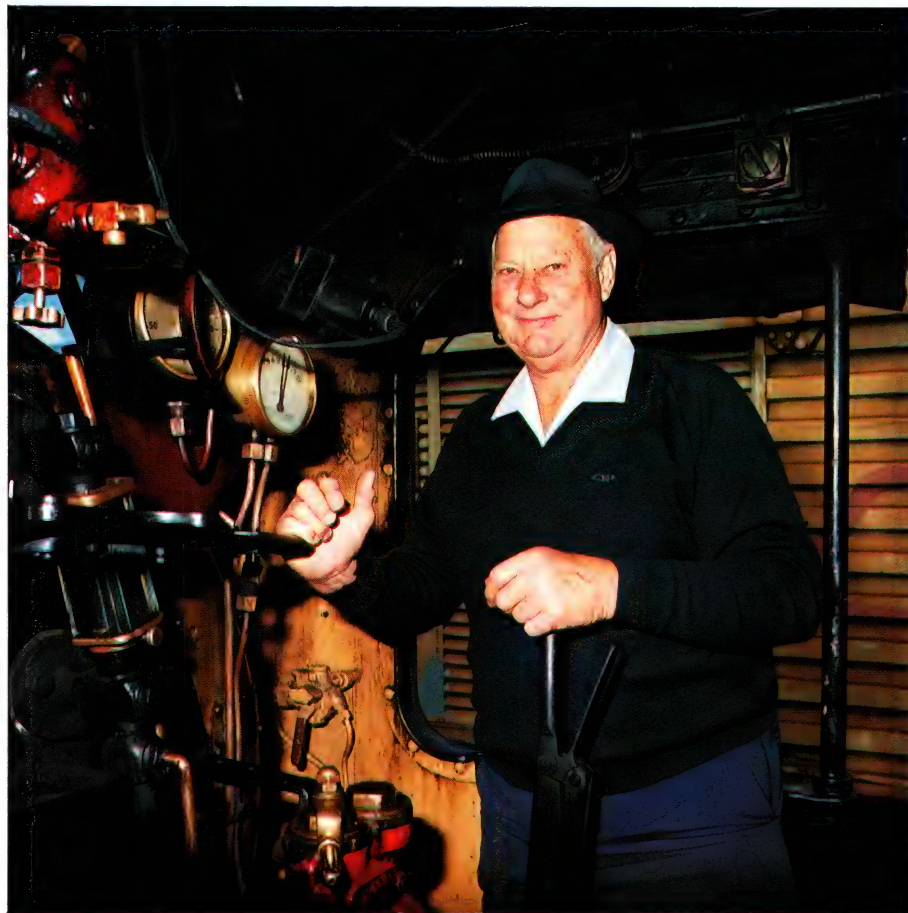
RAPID CHANGE, BROUGHT ABOUT BY THE EXPLORATION AND DEVELOPMENT OF AUSTRALIA'S MINERAL RESOURCES, COAL IN PARTICULAR, AND THE APPLICATION OF NEW AND EXCITING TECHNOLOGY, HAS CHARACTERISED THE PAST 125-YEARS OF PROGRESS IN RAIL TRANSPORT IN QUEENSLAND.

RECOGNITION OF THE CONTINUING IMPORTANCE OF RAIL TO THE STATE'S ECONOMIC DEVELOPMENT, AND THROUGH ITS CONTRIBUTION TO EXPORT TRADE TO THE ECONOMIC GROWTH OF AUSTRALIA, WAS CELEBRATED RECENTLY.

A HIGHLIGHT OF THE 125TH YEAR COMMEMORATION WAS A TRIPLE-HEADED STEAM TRAIN EXCURSION. IN SPANNING THE YEARS OF CHANGE IT CLEARLY DEMONSTRATED THE ENORMOUS CONTRAST BETWEEN EARLIER DAYS AND THE FAST, MODERN AND EFFICIENT RAIL TRANSPORT SERVICES OF TODAY. ►



TRACKS



THE ROMANCE OF STEAM IS TRULY PORTRAYED IN THIS PHOTOGRAPH OF QUEENSLAND RAIL'S 125TH ANNIVERSARY EXCURSION. THE THREE LOCOMOTIVES WERE BUILT BY WALKERS LIMITED AND DATE FROM 1926 TO 1956. DRIVER OF THE LEADING ENGINE WAS GEORGE JENSEN (LEFT) WHO JOINED QUEENSLAND RAIL IN 1943.



This year is significant in the development of Australian rail services as Queensland celebrates 125 years of achievement in rail transport and looks ahead to the future needs of business and commerce. Meeting the challenge of coal was the making of Queensland rail.

The State's first line, between Ipswich and Grandchester, was opened on 31 July 1865 as a passenger service.

It was at Grandchester that 600 rail enthusiasts and several thousand visitors gathered recently for the departure of an excursion train utilising three steam locomotives built by Walkers Limited at Maryborough.

They were the PB15 which entered service in 1926, the C17 (1951) and the BB18¼ (1956). As the centre of attraction at the celebrations they ran an excursion from Grandchester to Laidley some 12 kilometres away.

The last steam locomotive in Queensland ran in regular service in September 1969.

Driver of the 125-year excursion's leading steam locomotive was George Jensen. He recalls qualifying as a driver by stripping down an engine under supervision at Sunday morning classes in Ipswich "which, of course, were in our own time." Currently head driver at Ipswich, George joined Queensland Rail as a cleaner in

1943, becoming a fireman in 1949 and driver in 1955. He will retire in February 1991 at 65 years of age.

In addition to the celebrations at Grandchester the 125th anniversary program included the opening of Queensland Rail's historical centre at Ipswich, and the launch of railway author John Kerr's book *Triumph of Narrow Gauge – A History of Queensland Railways*. (see book review, page 61).

The historical centre's archival facility was developed in consultation with the Queensland State Archives. It includes papers, drawings and 16,000 photographs about 70 per cent of which are dated prior to 1920.

Another phase of the 125th celebrations was the launch of QR's commemorative Country Timetable in conjunction with a luncheon hosted by the Australian Society of Travelwriters' Luncheon Club; this was held in the lounge and dining cars of "The Queenslander" at Roma Street Station, Brisbane.

A world coal leader

In its 125 years QR has progressed to a modern rail system paralleling the build-up of export coal haulage in central Queensland, and the expanding freight needs of a growing

TRACKS



THE RAILWAY PAGEANT OF 1936 RECREATED THE TRAINS AND STYLES OF 1865 (LEFT) AS PART OF CELEBRATIONS TO MARK THE OPENING OF THE RAILWAYS DEPARTMENT HEADQUARTERS BUILDING IN ANZAC SQUARE, BRISBANE.

A MODERN ELECTRIFIED COAL TRAIN IN CENTRAL QUEENSLAND (LOWER) RUSHES ITS CARGO TO WAITING EXPORT PORTS.



economy. From small beginnings in the 1960's QR's coal haulage service is now a world leader with average weekly rail consignments exceeding one million tonnes.

The challenge of coal and its importance as an export income-earner for Australia inspired the rapid modernisation and development of Queensland Rail and set the pace for the future.

Annual QR freight volumes increased more than 10-fold during the past 30 years to more than 80 million tonnes and the major reason for this huge increase was the rapid growth in export coal haulage.

In addition to coal, other major freight items include agricultural produce, general freight, Mt. Isa mineral traffic, nickel and containers.

Export coal traffic, however, mushroomed.

In the 1960's, QR commenced overseas-destined coal haulage in four-wheeled VJM wagons with Beyer Garratt locomotives with a train load of 650 tonnes.

Dieselisation followed in the latter part of that decade.

The introduction in 1974 of the remote control of a second set of locomotives located towards the middle of the train brought about a significant advance in mineral train operations. This enabled the operation of gross train loads of 10,500 tonnes.

Annual tonnage of coal hauled in 1980, both export and domestic reached 40 million tonnes and currently is about 68 million tonnes.

Huge 110-tonne electric locomotives were introduced into coal traffic in May, 1987 in Central Queensland. Export coal haulage is the major role of the 2,100 km main line electrification network, linking the Central Queensland coal mines with export ports and Brisbane.

Vast electrified network

The electrified rail system in Central Queensland is one of the world's great heavy haul operations. Coal trains comprising up to 136 wagons and four electric locomotives haul all-up weights in excess of 10,000 tonnes to the ports of Hay Point and Dalrymple Bay, south of Mackay, and Gladstone.

Main line electrification has streamlined operations and reduced maintenance and operating costs. Annual fuel costs, for example, have fallen by more than \$16 million. Furthermore, the faster acceleration of electric traction compared with diesel electric locomotives has resulted in improved average journey times.

Passenger services for which the first line was established in 1865 remain important. With 150,000 passenger journeys on a normal working day the Brisbane suburban service, electrified in 1979, is continuing to develop, and introduction in July last year of the electric Spirit of Capricorn between Brisbane and Rockhampton dramatically increased the number of passenger journeys on this route.



TRACKS



Queensland Rail's upmarket tourist train, the Queensland, quickly established a fine reputation with travellers, when introduced in April 1986. Its restaurant and lounge car facilities, in particular, have proved popular with travellers on the 1681km route between Brisbane and Cairns.

Early days

Proposals to establish a railway in Queensland were first raised a few years before Queensland became a self-governing colony of the British Empire in 1859, and subsequently, in 1863, the first Railway Bill was presented to Parliament.

After much controversy, Queensland's first section of 3' 6" gauge (1067mm) "Southern and Western Railway" was opened from Ipswich (the head of the navigation on the Bremer River) to Bigg's Camp, a distance of 21½ miles (35km), on 31 July, 1865. Construction continued westward to the fertile Darling Downs, reaching Dalby in 1868 and Warwick in 1871.

The first locomotives imported from England for the infant "Southern and Western Railway" weighed 22 tons, burned firewood, and had a tractive effort of only 4,500lbs. Despite the fact that the development of steam locomotive power in Queensland was limited by a relatively low axle loading imposed by existing track and bridges, locomotives of up to 30,000lb tractive effort were introduced towards the end of the steam era.

In excess of 1,300 steam locomotives were operated by Queensland Railways, 70 per cent of which were built in Queensland.

World War II saw Queensland Railways successfully handle the huge logistical task in support of the Pacific War. But due to the lack of essential maintenance, its problems at War's end were on a scale never before experienced, and an ambitious program of rehabilitation was undertaken. This included provision of the most advanced steam locomotives, modern steel wagons and air-conditioned trains.

In 1950 Q.R. decided to introduce diesel electric locomotives, which had many advantages over steam traction.

The diesel-electric enabled the design of locomotives with a heavier axle load compared with the biggest steam engines suitable for use in Queensland.

They could haul heavier loads faster than steam and they did not require frequent stops for refuelling with coal and watering. Timetables could be cut and operating costs reduced. □

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The Goninan/GE Dash 8 locomotives - the first to be built outside the USA - are setting new standards in diesel locomotive performance.

Under licence to the General Electric Company USA, Goninan is building these locomotives for Westrail, Mt Newman Mining, Australian National and Robe River Iron Associates.

Goninan's engineering capabilities are essential elements in the company's commitment to the development of valuable export markets.

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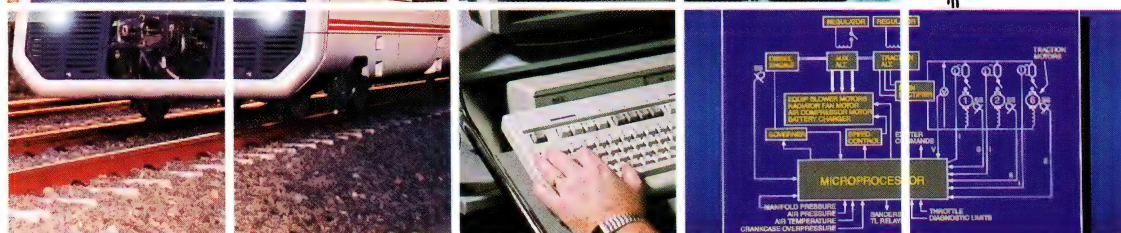


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SMALLEST OF THE AUSTRALIAN STATES, THE ISLAND OF TASMANIA IS A LAND APART FROM THE CHALLENGE OF DISTANCE WHICH ALWAYS HAS INFLUENCED THE DEVELOPMENT OF RAIL SERVICES ON THE AUSTRALIAN CONTINENT.

INSTEAD, RAILWAY PLANNING, ENGINEERING AND MANAGEMENT HAS PROGRESSED STEADILY WITH THE EXPANDING NEEDS OF BUSINESS AND COMMERCE.

THIS DEVELOPMENT IS CONTINUING TODAY WITH THE UPGRADING OF TRACK, ROLLING STOCK AND THE INTRODUCTION OF NEW TECHNOLOGY. THE RAIL NETWORK RUNS THROUGH SOME OF AUSTRALIA'S MOST PICTURESQUE COUNTRYSIDE WHICH ENVIRONMENTALISTS WANT PRESERVED FOR POSTERITY.



One of Australia's quiet achievers is AN Tasrail whose heavy freight services traverse rolling hills across the Tasmanian countryside almost imperceptibly, hidden from the mainstream traffic of the highways. Much of its 840 kilometres of track is away from the roads and settled areas.

Moving more than 2.5 million tonnes of freight annually AN Tasrail links the north-west near Wiltshire with Bell Bay in the north, Herrick and Fingal in the east, and Hobart and Maydena in the south.

The track runs through some of Australia's most scenically picturesque country serving the growing needs of commerce and industry without placing the natural environment at risk.

AN Tasrail is placing increasing emphasis on quality of service in which track upgrading, improved locomotive performance, better loading and handling facilities, all play a major role.

It offers its customers very competitive rates designed to encourage them to accept rail as the best bulk freight alternative, commercially and environmentally.


AN Tasrail's performance has improved dramatically over the past decade as a result of a combination of efforts in several areas – track upgrading, increased locomotive power, implementation of new technology where

owards y in Tasmania



Modern freight wagons service the needs of the southern-most city of Hobart.

Steel sleepers are being used rather than the concrete sleepers that are being installed on the Australian mainland track because they are cheaper, lighter to handle and do not require specialised expensive equipment to install them.

One third of AN Tasrail's mainline track has already been resleepered. The remaining sleepers will be progressively replaced by 1999. 

appropriate, adaptation of existing equipment wherever possible, and, at the same time, cost cutting and rationalisation.

Long-life steel sleepers

All sleepers in Tasmania used to be wooden. They had a limited life, were susceptible to rot and required intensive maintenance. Now all the wooden sleepers on AN Tasrail track are being replaced with steel sleepers which have a life of at least 50 years.

STRENGTH

ALUMINIUM RAIL WAGONS DELIVER



James S148C

W | E | S | T | R | A | C | E

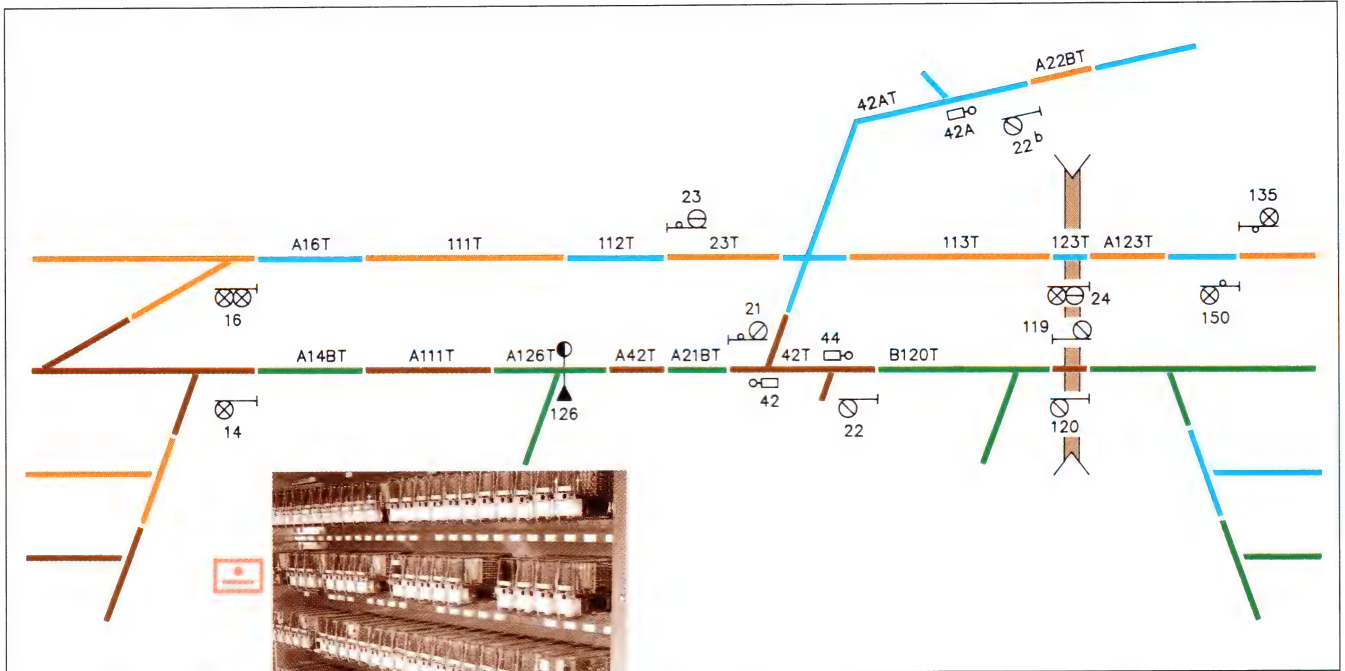
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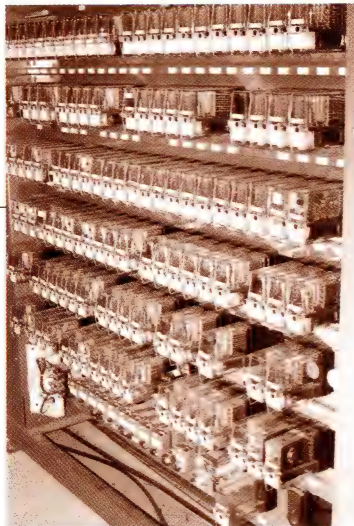
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Showing the Way Ahead

TRACKS

Maintenance work in the machine shop (top) and along the track (centre) helps to ensure an efficient rail service for AN Tasrail's customers.

Lower: A mixed freight train carrying sulphuric acid and timber stretches across lush farmland on its journey from Burnie to Launceston.



More than 40 per cent of the mainline track has been welded to form continuous rail.

AN Tasrail's rail was originally laid in lengths that were bolted together by overlaid plates. At least 60 per cent of derailments in Tasmania happen at weak joints that have dipped (like corrugations in roads), widened, or broken. About 50 per cent of track maintenance costs and 25 per cent of rollingstock damage are caused by jointed track.

AN has purchased a \$1.2 million flash butt welding machine which is accelerating the welding project because it can weld rail in the field. In the past most rail had to be taken back to the workshops for welding. Welded rail is stressed to prevent fracture and buckling caused by expansion and contraction with temperature changes, and is locked very securely to sleepers.

Modern computerised system

Several areas within AN Tasrail have been computerised. Direct access to Australian National's mainframe computers gives AN Tasrail several control systems including:

- ☐ Financial, budgeting and cost reporting.
- ☐ Accounts receivable and revenue statistics.
- ☐ Asset control
- ☐ Supply, purchasing and inventory
- ☐ Accounts payable
- ☐ Personnel Information Management System
- ☐ Automated control (Comcare)
- ☐ Traffic Information Management System (TIMS)

The Traffic Information Management System was commissioned in 1988. It is an online computer system designed by AN to help manage rail operations more efficiently.

A network of computer terminals is linked to a central processing unit and can provide



TRACKS



information such as which trains are running, how many wagons are on each train, details of wagon weights, destinations and contents; whether trains are late or on time; and condition of track and whether there are any speed restrictions.

The wagon fleet has been upgraded so that operations can be improved and maintenance costs reduced. A major component of this upgrading has been conversion from vacuum to air brakes and the installation of centre couplers.

More than 400 high-capacity wagons have been supplied from AN's mainland system to replace obsolete low-capacity wagons.

Because different types of freight have different loading, unloading and transportation requirements, AN Tasrail staff have redesigned old wagons and facilities to better suit each type of freight. Fertiliser wagons, for example, have had hinged roofs fitted to replace tarpaulins, which wear, tear and leak. The metal roofs provide far better protection for the superphosphate inside the wagon.

Modifications have also been aimed at increasing wagon productivity. Some of the old fertiliser wagons were short by today's standard. By joining two wagons together, two bogies and two sets of coupler equipment have been removed.

The FW class of log wagon, which carries hardwood logs, was converted to a four-bolster

Facing page: A signalman on duty at East Tamar Junction, Tasmania. Centre: Cement unloading at the Goliath depot, Railton. Lower: A TMS operator enters data. This page: Clay wagons heading through tall timber en route from Tonganah mine to South Burnie. Lower: The diesel workshop where locomotives are serviced and repaired.



wagon so that the wagons could also carry the shorter pine logs. This meant that the wagons could be used to carry hardwood logs in one direction and pine logs on the return trip, thereby doubling productivity.

Wagon productivity is being increased by upgrading bogies from 16-tonne to 18-tonne axle load capacity. This effectively increases the gross load capacity by 12.5 per cent without increasing the tare weight.

Logs are probably the most difficult cargo for rail to carry because they are different sizes and shapes and have different densities. As a result, each wagon can have different weight distribution from side to side and between the wheels. AN Tasrail has found these differences to be as much as 40 per cent. This imbalance directly affects the handling characteristics of wagons.

The wheel load detector

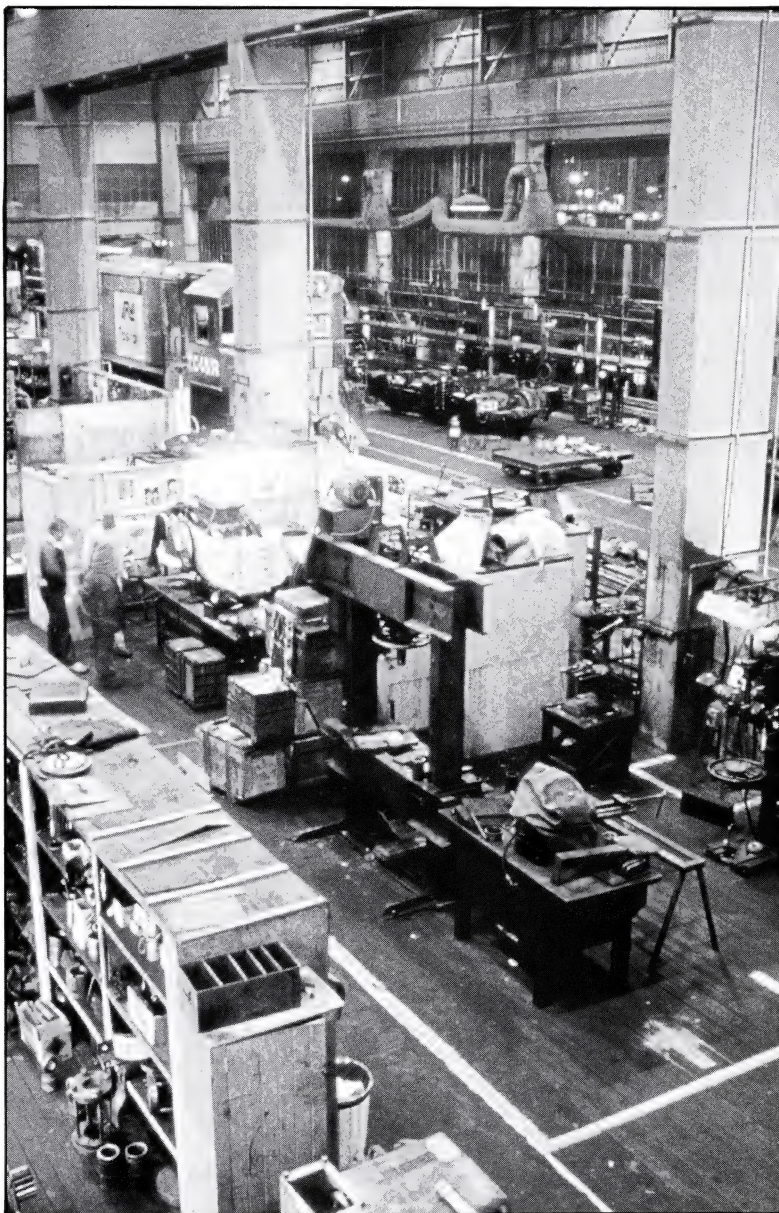
An electronic wheel-load detector is helping to correct the situation.

Strain gauges bonded to the foot of the rail between sleepers measure the bend in the rail caused by the weight of the wheel passing over it. Check weights can be taken accurately as the train passes over the detector at speeds of up to 40 km/h. The rail deflection is recorded by a computer and the results for each wheel on the wagon are printed out. If the load is unacceptably uneven a warning light flashes to prompt load re-adjustment.

The freight task for AN Tasrail has grown by 87 per cent in 10 years. More than 50 per cent of the total comes from Tasmania's abundant forests to meet the needs of Australian Pulp and Paper Mills (APPM) and Australian Newsprint Mills (ANM) as well as the Forest Resources mills at Longreach.

Coal, cement, containers, sulphuric acid, fertiliser, liquid clay and quartz are other major freights. Coal accounts for about 20 per cent of AN Tasrail's revenue. The container traffic is mainly from Burnie to Hobart.

The changing face of AN Tasrail is bringing a new image of modernity and efficiency to the freight needs of the island state and providing a service which is increasingly recognised for its quality and reliability.□



BULK LOADING AND UNLOADING WITH –

The video aid to target speed control

By JOHN PERRIN

GEC Alsthom Australia Limited's Projects Division

The problems faced by train drivers of Australian coal and grain trains in achieving the target speed for efficient loading and unloading have now been resolved by an innovative radio/video system developed by BHP and GEC Alsthom's railway signals and communications division.

This unique Australian system, called the Radio Telemetry Train Speed Indication system (TSI), now allows train drivers to read on digital panels their exact speed and most importantly, how far they are from target speed.

During loading and unloading operations it is necessary to drive a train through the loading or unloading station at a constant, very slow speed. This allows the cars to be filled or emptied "on the run".

For many years drivers have had to judge the speed of their trains aided by a succession of traffic lights mounted along the side of the track. As train speed has to be held at 2 km/h and traffic lights only indicated a required speed which was

changed by "increase" or "decrease" arrows, drivers were set a very difficult task.

To hold a fully-loaded eighty four-car train, 1.5 kilometres in length, at 2 km/h, required great skill, judgement and experience. Inevitably, there were problems.

It was these difficulties with low speed control that led the Kooragang Coal Loader authority to approach GEC Alsthom Australia in mid 1987 for an alternative radio control system. There were a number of possible solutions to this problem. They were; the use of radios only for voice communication, the use of auto-speed detection sensors, Doppler radar or ultrasound. The TSI system was chosen for several reasons – its automatic operation and its rapid, clear and accurate display of information.

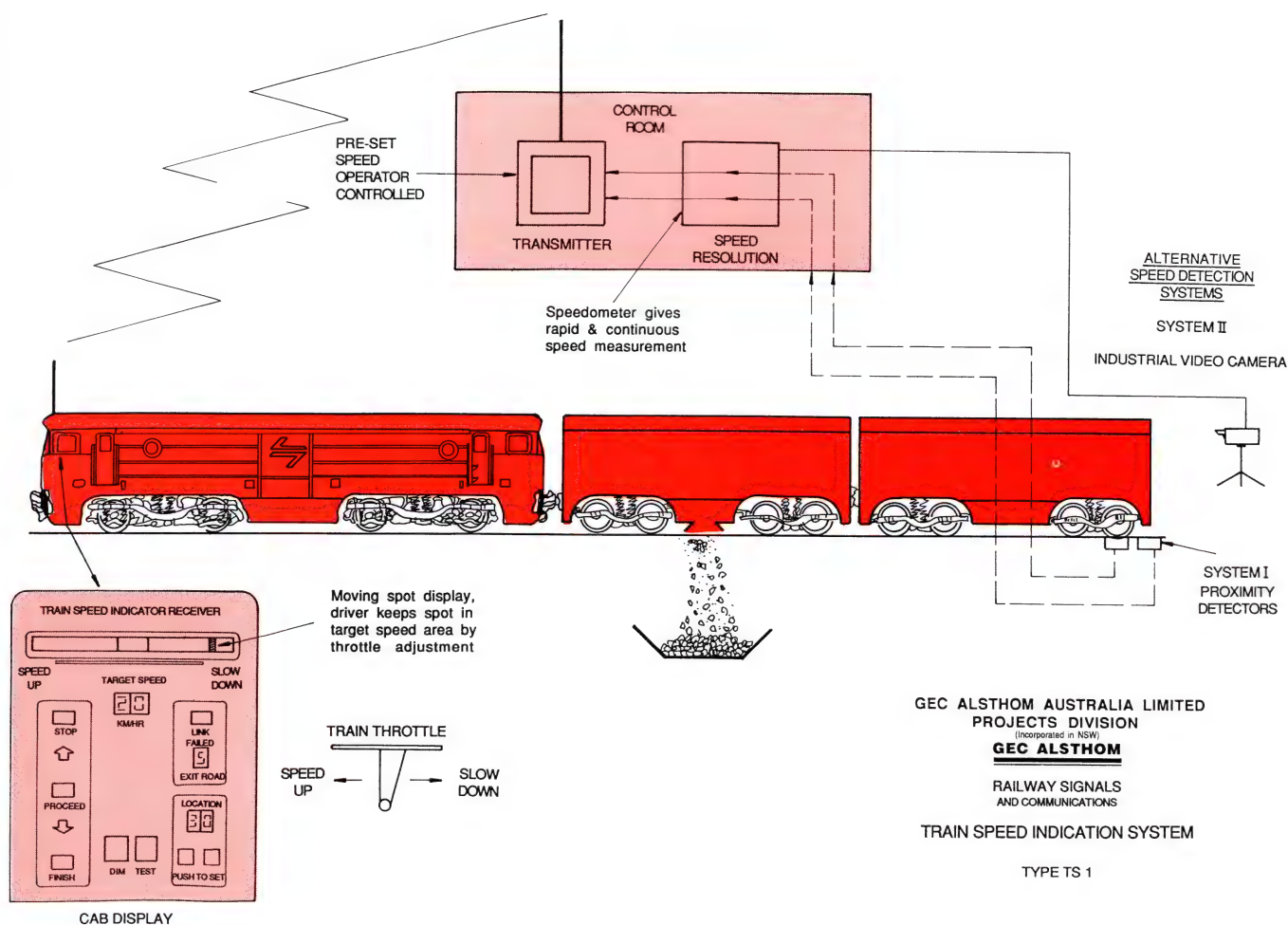
GEC Alsthom Australia in association with BHP devised a prototype system which was tested and commissioned at Kooragang Island coal loader within six weeks. By November 1987 the pre-production prototypes were in action.

The first TSI system utilised tread switches mounted on the track. As the cars' bogies came in contact with these switches successively, a microprocessor unit calculated the speed of the trains from the pulse rate generated by the passage of the train across the switches.

The actual speed and speed difference were read by a multiplier unit and transmitted by radio to a receiver in the train driver's cabin. This information was displayed on a small console unit in a manner which provided the driver with a clear indication of target speed and actual speed relative to the limits.

As well as speed indication, the system displayed all the standard stop, speed up, proceed, slow down, reverse and finish signals to the driver. Additional information, such as the exit track number could also be signalled to the driver by the controller.

An initial concern was the practicality of using radio to communicate to the unit in the locomotive cab. Testing showed that reception was adequate even with a



low transmitter power of approximately one watt.

The next stage was the physical appearance and location of the receiver. The initial trials produced mixed results. Due to the conceptual interference from traffic lights, which have been installed for decades, to this new impact innovative unit, some drivers initially were reluctant to use it. However, after a few testing periods, they became used to relying on a display unit within their cab as opposed to the procession of traffic lights outside monitoring their speed.

Speed with more accuracy

Improvements were made to obtain more rapid and more accurate train speed readings.

The next TSI contract awarded to GEC Alstom Australia was part of the overall signalling project for the new rail loop built specifically for the grain handling Authority at Port Kembla, NSW.

Proximity sensors utilised on level

crossing systems require no mechanical contact with the train and are mounted below rail level, approximately 50mm from the train wheel flange. For the Port Kembla grain unloader, these sensors were mounted in pairs, the train being detected in and out of each pair. The speed calculation was carried out by a speed resolution card which registered the time travelled between each sensor pair.

A weighbridge was installed 100m prior to the unloader building and it was necessary to control the speed of the train over the weighbridge as well as the unloader. Three pairs of sensors were placed ahead of the weighbridge where a maximum speed of 5 km/h was required.

A receiver above the control position allowed the grain unloading controller to view the same information as the train driver. Thus, as the controller had the unloading operation in full view he could instantly signal to the driver to start, stop, reverse or change target speed through the use of the manual control console. The train driver could

change speed with the control box in 0.1 km/h stages until the optimum train speed was achieved.

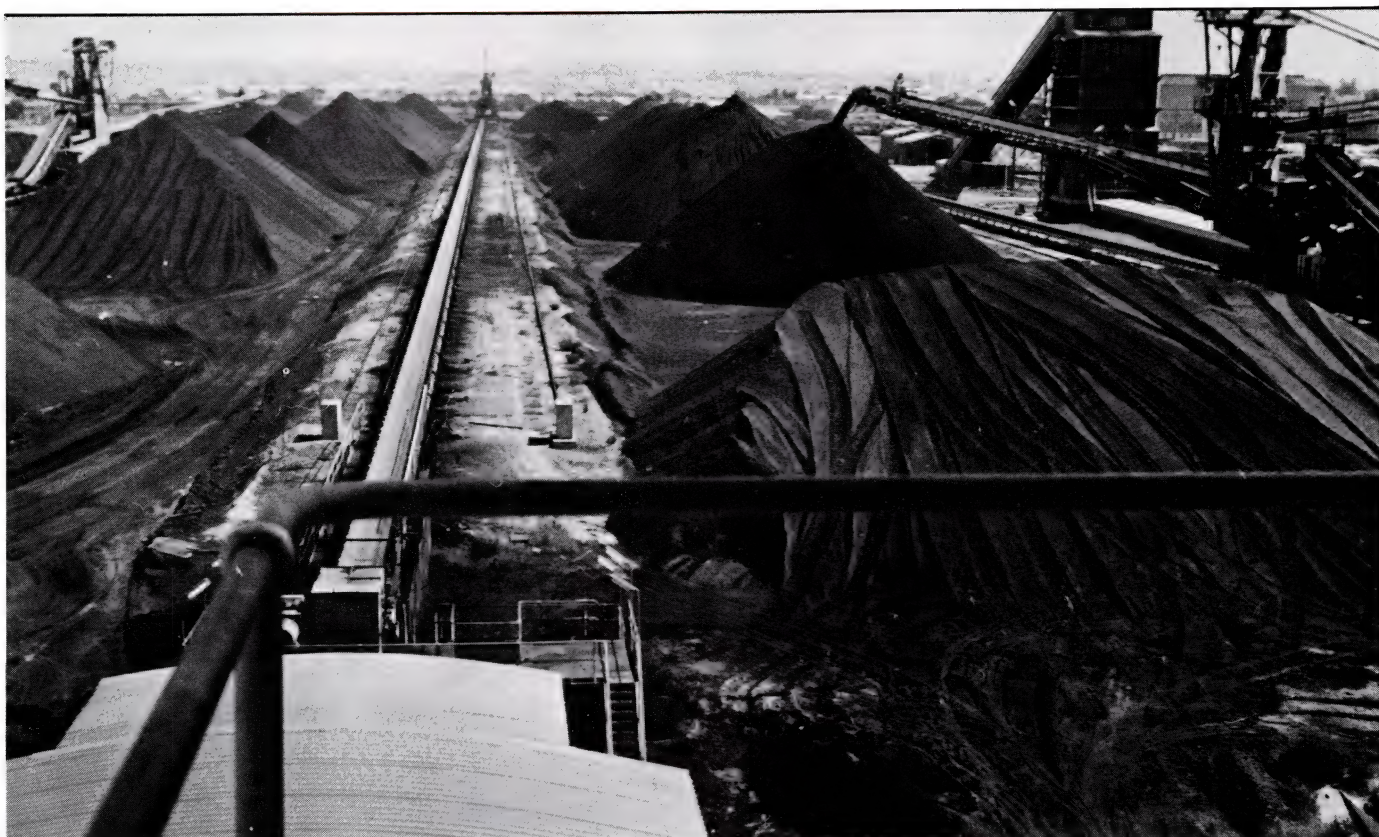
During the trials at Port Kembla there were some difficulties in receiving regular speed inputs to the receiver. The moving spot indicator would move erratically from side to side which confused the train driver. After many think-tank sessions, the answer was found in the fine tuning of software and readjustment of the track sensors.

Although the use of proximity switches improved the reliability of the TSI system, it was still limited by the resolution imposed on it by the use of the fixed gap in the trackside hardware to measure the speed. GEC Alstom Australia engineers continued their search for a more flexible and reliable method of detecting train movement.

A video camera solution

The solution was the use of a video camera to replace trackside switches. Able to create a moving image of the

TRACKS



Coal which has been rail-hauled to Port Waratah, Newcastle, NSW, awaits export shipment.

train and assisted by a computer to calculate the equivalent train speed, the video camera proved far superior to other possible methods.

The video camera is mounted on a post 10 metres from the track. The system's revolutionary qualities are that it can obtain speed measurements four times a second, as opposed to the previous one second time interval and importantly, they can be made independently of the actual train speed. Speeds as low as 0.1 km/h can be measured and the speed display now presents a smooth picture of the movement of the train.

The speed measurement and control system consists of a video camera, an AT-compatible computer, a display monitor which may be switched between video and computer displays, and a serial link to radio telemetry equipment.

The video camera is dedicated to the task of estimating the train's speed. Speed measurement is performed by comparing the relative positions of the train in two successive video images. Velocity

estimates can be updated four times per second. Output from the camera or text prompts from the computer may be displayed on a video monitor. Input source for the video monitor is software selectable using video multiplexing hardware.

Computer software allows the operator to control the system by selecting from menus. The software compares the target speed, entered at the keyboard, with the actual speed calculated by the computer from the video images of the moving train.

When actual speed is more than 100 per cent of the target, the "slow down" signal is generated. When actual speed is less than 90 per cent of the target, the "speed up" signal is generated. These messages, along with status and location information are passed along to the radio telemetry equipment for transmission to the locomotive driver.

Some of the key advantages of the speed estimation system are that it has no moving parts and the equipment is located away from the

track hence it is more reliable. It requires little maintenance and it is especially accurate at the low speed typically encountered in bulk loading and unloading of trains.

The first application of the video based Mark II TSI system occurred at the Kooragang coal loader, the site of the first development of the TSI. The video camera was initially set up above the train looking down on top of the cars. This positioning proved to have problems and the final placement had the video camera sighted horizontally looking at the side of the train.

After the KCL Mark II TSI system was successfully commissioned, the next system was installed at the Drayton coal loader and is now in successful operation.

The stage by stage development of the GEC Alsthom Australia TSI system demonstrates that Australia's railway signalling engineers are able to successfully solve engineering problems in order to improve efficiency and increase productivity in our railway network. □

The growing interest in short rail excursion lines

THE DEVELOPMENT OF TOURIST
EXCURSION RAIL SERVICES, MANY
LINKED TO CHERISHED PLACES AND
EVENTS RELATING TO EARLY DEVELOPMENT, IS
CREATING GROWING INTEREST IN AUSTRALIA
AS THE NATION MATURES.

IN THE UNITED STATES OF AMERICA SUCH
PRIVATELY-OWNED AND OPERATED RAIL
EXCURSION LINES HAVE PROLIFERATED.

IN THIS ARTICLE

MORGAN LAWRENCE

TRAVELS THE TRACKS OF SOME OF THEM
AND SHARES HIS EXPERIENCES.



*The beautifully-restored 1920s
observation car on the Napa Valley
Wine Train.*

TRACKS



The short rail excursion lines of America average 55 kilometres in length. To learn more of their modern-day popularity, I rode several of them in Arizona, California and Washington state. Each was exciting, enlightening and proved to be a viable family tourist attraction.

The Grand Canyon Railway

On 14 September 1901 the *Williams Arizona News* announced to the world that the first passenger train had reached the Grand Canyon's south rim over a new 96 kilometre rail line. Some eighty-eight years later, on 17 September 1989 midst a jubilant celebration, the "new/old" Grand Canyon Railway (GCRY) resumed that scheduled passenger service from Williams to the canyon's south rim.

We arrived at GCRY's restored and refurbished station in Williams for the northbound 10:30 a.m. departure to the canyon.

In recreating the historic era of the "good old days" of rail travel, GCRY's rolling stock is headed by one of four rebuilt American 1910 vintage steam locomotives pulling refurbished 1920s Harriman coaches. Train crews, engineers, brakemen, and hostesses are attractively costumed in period uniforms.

En route, the visitor thoroughly enjoys viewing scenic rolling hills, mountain landscapes and wild game foraging the forest in late afternoon. On board, complimentary light snacks and beverages are served, accompanied by live entertainment.

The three-hour stopover at magnificent Grand Canyon National Park is the great attraction of the day-long trip. The park's public areas have quality gift shops, museums and on-going lectures and escorted tours by park rangers. Historic El Tovar Hotel offers excellent dining. All are recommended.

For those who enjoy hiking (weather permitting), the park rangers urge all to walk on the well-marked and defined trails adjacent to the canyon rim. There are abundant photographic opportunities of breathtaking natural beauty.

GCRY officials introduced daily excursions to the canyon from 1 March 1990. A second daily train commenced on 1 April. One daily train operates from October to 31 December 1990.

In the first four months of GCRY's operation, individual weekend runs carried the maximum 500 passengers per trip. The line currently averages 1,000 reservations per day; therefore, early reservations are suggested. You won't be disappointed.

The Spirit of Washington

Local rail enthusiasts in Washington State are operating a dozen short lines. One of these is the Spirit of Washington dinner train.

The Spirit's three-hour daylight run traverses 56 kilometres of Northern Pacific Railroad mainline (abandoned in 1984 by Amtrak) between Yakima and Ellensburg. Riders view the endless panorama of Yakima River Valley's 530,000 kilometres of rich farm land, and grazing wildlife on the foothills of the spectacular Cascade Mountain Range.

Rolling stock of the Spirit comprises stainless steel cars which are post-war Santa Fe and Reading Railroad streamliners. Vista dome observation cars, handsome dining cars and an elegant bar-lounge car, lovingly restored in the art



Left: The famous 1910 steam locomotive operated by the Grand Canyon Railway. Centre: Tourists on the Grand Canyon train ride. Right: The Napa Valley Wine Train nears its destination.

deco period, are drawn by modern diesel-electric locomotives.

The Spirit of Washington's train runs Friday and Saturday from April to September. Dinner service commences immediately on 6 p.m. departure from Yakima. Menu selection offers three entrees; prime rib of beef, fresh Columbian River salmon and chicken Kiev, all served with a crisp salad, local vegetable medley and rich chocolate cake with strong-flavoured coffee. The dining car staff is cordial and professional. Enhancing the dining pleasure are freshly cut flowers, starched linens, crystal stemware and silver flatware.

The Spirit also operates a Sunday brunch train, departing Yakima at 10 a.m. year round, and boasting a menu which includes a variety of Yakima Valley fresh fruits and cheeses. If the dinner train cuisine is the standard, then brunch on Sunday should be equally delectable.

Visitors to the Yakima region will find the Spirit trains a "must do."

Mt. Rainier Scenic Railroad

Mt. Rainier National Park, established on 2 March 1899 encompasses 978 square kilometres. An estimated 1.9 million visitors each year makes it one of the world's most popular tourist attractions.

Summer guests in the park area will discover the Mt. Rainier Scenic Railroad excursion a splendid way to view 4,400-metre high Mt. Rainier in all its majestic beauty. The railroad right-of-way is a 64 kilometre short line through Gifford Pinchot National Forest along the western border of the park between the towns of Elbe and Morton, Washington. Daily one-and-a-half-hour trips run weekends and on Memorial Day throughout September, departing 11 a.m., 1:15 and 3:30 p.m.

DESIGN SUPPORT

ALCAN DELIVERS



James S148D



All trains are pulled by a 1920 vintage steam locomotive. Standard coaches and open vista cars are used on day excursions.

The dinner train departs from Elbe at 5:30 p.m. Saturdays through to Labour Day; and 1 p.m. on Sunday from October to November. The consist includes standard coaches with vinyl covered seats, pullman open platform observation car with old-fashioned wicker furniture, and a standard dining car.

All dinners include shrimp cocktail, tossed green salad, roast prime rib of beef, vegetables, dessert and coffee. There are two seatings for dinner, and reservations are required.

Short excursions are extremely popular with children, while the dinner train appeals to a more mature crowd. Although the train is not luxurious, it is fun — and recommended.

The Napa Valley Wine Train

For 100 years Napa Valley had passenger and freight services operated by Southern Pacific Railroad Company, which were abandoned in 1984. In 1987, acquisition of 125 acres of right-of-way and 20 miles of Southern Pacific track between Napa and Calistoga was bought by the Napa Valley Wine Train Inc. (NVWT).

Vincent DeDomenico, principal shareholder and chairman of NVWT, is a retired entrepreneur and former chairman of the board of Golden Grain Macaroni Company food products. The NVWT is now DeDomenico's prime enterprise. In spite of local opposition that would have discouraged a lesser person, on 16 September 1989, amidst much fanfare, a round-trip daily service (except Monday) was inaugurated between Napa and St. Helena.

The train is an elegant gourmet palace on wheels with all the appointments equal to famous trains of the Belle Epoque era at the turn of the century.

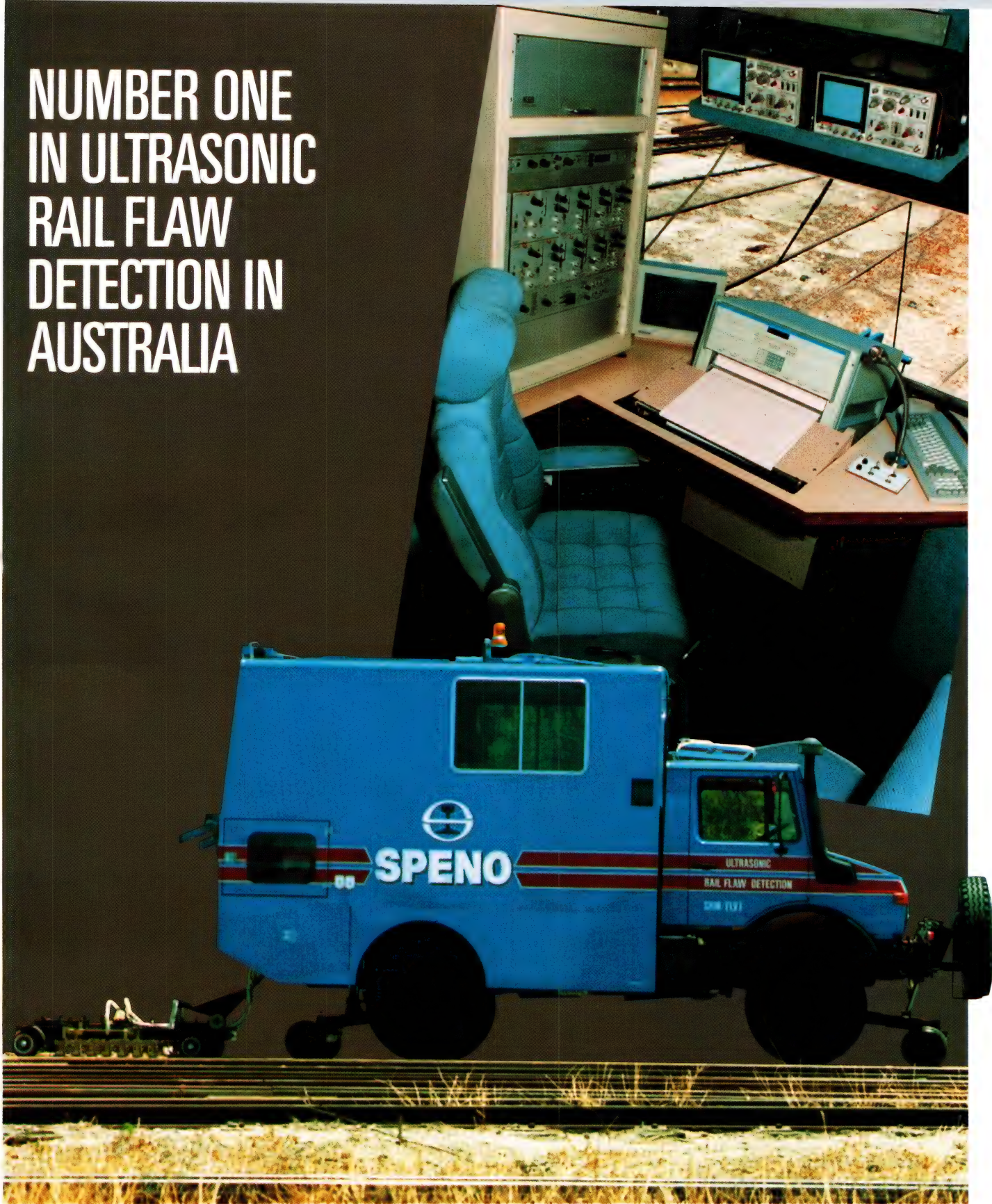
The train's consist is headed by modern diesel locomotives and has five rebuilt ex-Denver Rio Grande and Western Railroad 1915 vintage cars. Interior decorator Norman Roth, in keeping with the region, used a colour scheme of burgundy, champagne gold and various vineyard hues. Furnishings include pastel-coloured plush seats, mahogany wall panels, crystal light fixtures, brass bric-a-brac and hand-etched frosted glass partitions.

The newly-equipped kitchen car is fully staffed with professionals capable of preparing the finest cuisine. A typical luncheon menu (entrees change continuously) offers three selections: breast of Petaluma chicken, fillet of Norwegian salmon or certified Black Angus fillet mignon. First course is green salad with hazelnut-vinaigrette dressing and wedges of blue cheese. Dessert is served in the observation lounge cars with generous cups of varied hot beverages. All pastries are freshly baked, including a superb marjolaine gâteau.

Only Napa Valley's finest wines are served and sold by the bottle or glass on board. Customer service vice president Costantin Capellas advises that by prior request special dietary dishes can be prepared. There are two seatings for dining arranged at the time of ticket purchase. Train fare is separate from meal charge. All alcoholic beverages are at an additional cost.

During autumn and winter the leisurely-paced luncheon run (58 kilometres at an average speed of 18 km/h) was a relaxing experience. The NVWT caters to an up-market clientele, and some people may consider the costs high; not so, however, as the excursion is first-rate in every way and a top-quality tourist attraction. □

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New signal plan

\$20 MILLION CONTRACT

FIRST APPLICATION OF THIS TYPE OF AUTOMATIC TRAIN PROTECTION BY A RAILWAY SYSTEM IN AUSTRALIA

Queensland Railways have contracted Westinghouse Brake & Signal Company (Australia) Limited, a Hawker Siddeley Rail Division company, to resignal some 325km of the Queensland coastal railway system between Rockhampton and Mackay.

The \$20m contract covers the design and installation of power signalling equipment with Centralised Traffic Control (CTC), together with Automatic Train Protection (ATP).

The new system will result in significantly faster trip times for Queensland Railways Traveltrains and Freighttrains between the two

centres . . . initially up to an hour's saving.

The new Westect ATP system will include an on-board computer to display to the driver the maximum allowable speed at any time and will assume control of the braking function if necessary to prevent the train over-running line side signals or exceeding speed restrictions.

Information concerning the location, distances, gradients and allowable speed for each section of track will be read by the on board computer from track mounted transponders.

Information concerning signals will be transmitted directly to the locomotive by radio allowing



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for northern seaboard

OVERS 325 km



continuous supervision of the train through the signalled territory.

All safety-critical aspects of both hardware and software, will be developed by an experienced team of engineers operating from the company's new signalling technology centre in Melbourne.

The new ATP system will pave the way for an extension of driver-only operation north from Rockhampton to Mackay and will be the first application of this type of Automatic Train Protection by a railway system in Australia.

The computer will calculate at what speed the train should be travelling and when it should be braked in order to be able to stop at the next signal or to comply with a reduced speed requirement. The system will not interfere provided that the driver reacts in accordance with signal aspects and speeds restrictions.

However, if the driver fails to control the speed of his train correctly, it will first warn him and then if he does not respond, it will apply the brakes to stop the train safely.

Queensland Rail currently is the only Australian network

Hauled by electrically-powered engines the Sunlander glides almost unnoticed from Brisbane's Roma Street Station at the start of its long 1,681 kilometre journey to the northern seaport of Cairns.

which uses Automatic Train Control (ATC). Commercial application of this system began in September, 1988, on electric intercity trains on the section between Caboolture, on Brisbane's northern outskirts and Nambour. □



DOOR-TO-DOOR SUPERPAK SERVICE

Twelve interstate Superfreight trains every day between Sydney, Melbourne, Brisbane and Adelaide are participating in NSW State Rail's door-to-door Superpak service.

State Rail has entered into a \$5 million five-year leasing and maintenance arrangement for 550 Superpak containers to replace outdated railway-owned containers. As a result operating costs are being reduced and clients have a wider choice.

The new service offers a door-to-door service. The Superpak freight container is collected by State Rail and taken overnight to an interstate capital city by Superfreighter and delivered at the other end.

State Rail has increased its share of the interstate freight market from 25 per cent to 29 per cent in the past twelve months, and this new service is expected to boost business further.

THE LONGEST TRAIN IN THE EAST

The longest train yet to run on the eastern seaboard between Sydney and Melbourne was operated recently by New South Wales State Rail as a trial demonstration of the capability of rail transport in Australia.

It was 1.3 kilometres long and was hauled by four 81 class locomotives capable of generating 12,000 horsepower.

The 3,000 tonne train of 53 wagons carried 174 containers of general freight.

"This long Superfreighter

carried more than twice the tonnage of a normal freight train, and is one of a number of new initiatives State Rail is trialling to further improve our market share," said Vince Graham, State Rail's group general manager, freight and passenger services.

"During the past twelve months, market share on the Sydney-Melbourne corridor has increased by five per cent."

The NSW Government is investing \$600 million in the State's freight and country passenger infrastructure. Tenders were invited recently for the supply of 80 new locomotives. These will be the most powerful in the State, at up to 4,000 hp.

"These new locomotives, together with investment in signalling, crossing loop extensions, wagon tracking and computerised freight information will significantly improve reliability and ensure the rail freight industry continues to win more freight off the roads," Mr Graham said.

BIG

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to upgrade terminal and handling facilities

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QUEENSLAND RAILWAYS



Freighttrain

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305 Edward Street, Brisbane



Mr Cliff Simmons

ROA'S NEW ENGINEERING RESEARCH MANAGER

Cliff Simmons has been appointed Engineering Research Manager of Railways of Australia following the departure of Michael O'Rourke to the Victorian Public Transport Corporation. A metallurgical engineer by profession, he obtained his qualifications at Royal Melbourne Institute of Technology before commencing his association with railways in the Victorian Railways as it was then known.

He came to Railways of Australia following the last seven years as manager of the Public Transport Corporation's Scientific Services Department where he headed a multi-disciplinary team of scientists, engineers and technical personnel responsible for the application of diverse

technological skills devoted to the enhancement of freight and passenger transport in country and metropolitan Victoria.

His professional activities have been supported by active involvement in several professional associations over the years. Currently, he is Chairman of the National Association of Testing Authorities (NATA) Non-destructive Testing Registration Advisory Committee.

A keen student of railways, he is actively involved in the operations of the Emerald Tourist Railway Board (Victoria's famous Puffing Billy). Family activities include go-carts and gardening.

With an extensive background in the technical aspects of rail transportation he believes that in this era of business-orientated, capital-intensive rail systems the selective application of technology to key aspects of the rail haulage task is fundamental to efficiency improvement and ultimately, transport cost minimisation. □

UIC APPOINTS NEW CHAIRMAN

The International Union of Railways (UIC - Union Internationale des Chemins de fer), of which Railways of Australia is a member, at a recent general assembly meeting ratified the nomination of Peter Langager, Director General of Danish State Railways to become UIC chairman for 1991/92.

He succeeds Vesselin Pavlov, Bulgarian Transport Minister and State Railways chairman who has held the UIC position since 1989.

The UIC research office co-ordinates organisation and management of international research and development activities on behalf of its 44 member railways around the world. □

IMPROVED WA INTERSTATE SERVICES

Considerably improved freight services from Perth to Adelaide and Melbourne have resulted mainly from changes in train marshalling arrangements at West Kalgoorlie.

Under a new loading system no shunting is required at West Kalgoorlie.

Concurrently Adelaide to Perth Westliner services have increased to six services a week and five new Eastliner services are operating. Between 80 and 90 per cent of the interstate trains are now running on time compared with about 50 per cent earlier this year.

When trains arrive at Kalgoorlie the locomotives are changed and the Australian National brake van is detached. If the trains are longer than 80 wagons (the WA limit) then the extra wagons are always those destined for West Kalgoorlie.

Intra-state trains now operate between Perth and Kalgoorlie to remove the need to shunt interstate trains. □

NEW COAL SIDING IN WA

A new siding at Chicken Creek near Collie, WA, came into operation recently with the transfer of 1,000 tonnes of coal in 20 XG wagons to the Cockburn Cement plant at Soundcem.

Griffin Coal asked for it to be built. Westrail constructed the track and supplied the materials for the siding while Griffin Coal completed the earthworks and coal-loading facilities.

More than 1.5 km of main track and 0.5 km of run-around was built at an estimated cost of \$650,000. □

Passengers leave the rail service at Warrnambool, Victoria, and take the remainder of their journey across the border into South Australia and places on the way in Australia's longest road coach.



V/LINE'S LONG COACH

Australia's longest road coach (14.5 metres and seating 60 passengers) is operating on V/Line's InterCity service between Warrnambool, Victoria, and Mount Gambier across the border in South Australia.

The coach is fitted with a "kneeling device" which allows the left front airbag to be lowered 125 mm making it easier for older people to board and alight.

It is equipped with a speed limiter.

In six years V/Line passengers between the two cities have increased about 80 per cent to 21,400 a year.

The new coach is 2.3 metres longer than any other operating in Australia, has 25 per cent extra capacity, and is \$200,000 less to buy than a conventional double-decker. V/Line says older people had reservations about double-decker coaches and found the steps difficult to negotiate.

The long coach has a 13 cubic-metre freight capacity compared with the normal eight or nine cubic metres. Its chassis was supplied by Saab-Scania of Campbellfield, Victoria, and it was fitted out by Volgren Australia at Dandenong. □

OPERATIONAL CHANGES FOR BRADKEN

Bradken has announced closure of its Griffin wheel plant, at Runcorn, Brisbane, with the result that the ANI Group of companies will rationalise Australian wheel manufacturing at the Comsteel, Newcastle, plant.

The closure of the Griffin wheel plant in no way impacts on the Bradken foundry activities in supply of railway castings and traditional products; however it will give added capacity to the Runcorn foundry which shared steel melting facilities with the wheel plant.

As part of the overall company rationalisation Bradken will upgrade other plants and facilities including the redevelopment of the Comsteel foundries which will now be administered by Bradken.

Included in this rationalisation will be the relocation of Bradken's Sydney head office from O'Riordan Street, Alexandria to Waratah, Newcastle by the end of October 1990. This relocation and capital expenditure places Bradken at the centre of ANI's manufacturing operations.

Bradken will continue to have a direct involvement in the railway industry from their Brisbane KW Plant at Runcorn as well as from other Bradken plants throughout Australia. □

ROA YEARBOOK BOOKINGS

Advertising space reservations will close at the end of October for the 1991 edition of The Railways of Australia Year Book and Personnel Directory. The Year Book has been produced since 1984 and has become an essential reference medium for all associated with the railway industry.

Four-colour rates are: Full page \$2,500 net; Half page \$1,500 net. Size for size film positives are required, right reading and emulsion down. Screen 150.

Type size for a full page is 270 x 175mm and for a half page 130 x 175mm.

■ Deadline for material: Friday 30 November 1990.

Space reservations and material should be addressed to: The Advertising Manager, 1991 ROA Yearbook & Personnel Directory, Railways of Australia Services Pty. Ltd., Level 4, 85 Queen Street, Melbourne, Vic. 3000. Tel (03) 608 0811. Fax (03) 670 8808. □

Want to know more about Australian Railways?



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The "Spirit of Capricorn" — Brisbane to Rockhampton.

Australian National's "Ghan".



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NETWORK



NEW PRODUCTS & PROCESSES

Information and photographs about new products and services available from Australian companies serving the rail transport industry, particularly those relating to new technological developments, should be forwarded to the Editor, Network, Railways of Australia (Services) Pty Ltd, Level 4, 85 Queen Street, Melbourne 3000.



Designed for the mineral sands trade Westrail's new XY wagon is loaded at the TI-West joint venture bay, Muchea.

Westrail builds a new wagon

Westrail has produced a new wagon to cater for the TI-West Joint Venture, which has begun mining mineral sands at Cataby, north of Perth.

The contract calls for Westrail to haul 400,000 tonnes of mineral sands a year 90 kilometres from the loading siding at Muchea to Kwinana, and backload smaller quantities of coal from Collie.

Mineral sands are dense and heavy, while coal has a lot of volume for its weight.

The mineral sands require careful loading through a small opening with strict dust control while coal is usually dumped into a large open wagon.

Westrail's result is a wagon classed as the XY, with three individual opening systems – large and small loading hatches at the top and bottom discharge dump doors for unloading. Designed and built as Westrail's Midland workshops, the new wagon is thought to be the first of its kind in Australia.

"We first planned to use two types of wagons for the job," said Brian Cornish, Westrail's Engineering Services Manager. "However, a

single-wagon fleet meant much more efficient operation so that became the target. The XY wagon meets tough design requirements and will do the job well."

The Midland workshops will build 18 of the XY wagons for the Cooljarloo project. The work is worth \$4 million a year to Westrail. □

A smaller turbocharger

The RR 131 turbocharger from ABB Turbo Systems Ltd can handle air volume flows between 0.45 and 1.30 m³/sec at a 3:1 compressor pressure ratio.

The overall turbocharger efficiency level is around 60 per cent while compressor pressure ratios are about 3.2 for large trims and 3.7 for small trims. Turbine inlet temperature limit will be at 750°C.

The RR 131 includes the same design features as the larger types of the RR series.

With the RR 131 ABB Turbo Systems enlarges its RR . . 1 turbocharger family towards smaller sized high-speed diesel engines, offering them the advantages of its know-how.

For further information: ABB Turbo Systems Ltd, Mr Paul Russak, Sales Department ZTV, 5401 Baden. Tel: 056/75 40 37. Fax: 056/21 26 19. □

Aluminium Wagons' Potential

Design engineer for Alcan Australia Ltd, Mr Terry Callaghan, says two prototype aluminium bottom-dump coal wagons each of 100 tonnes gross capacity introduced into regular NSW Hunter Valley service in 1987 are still in operation.

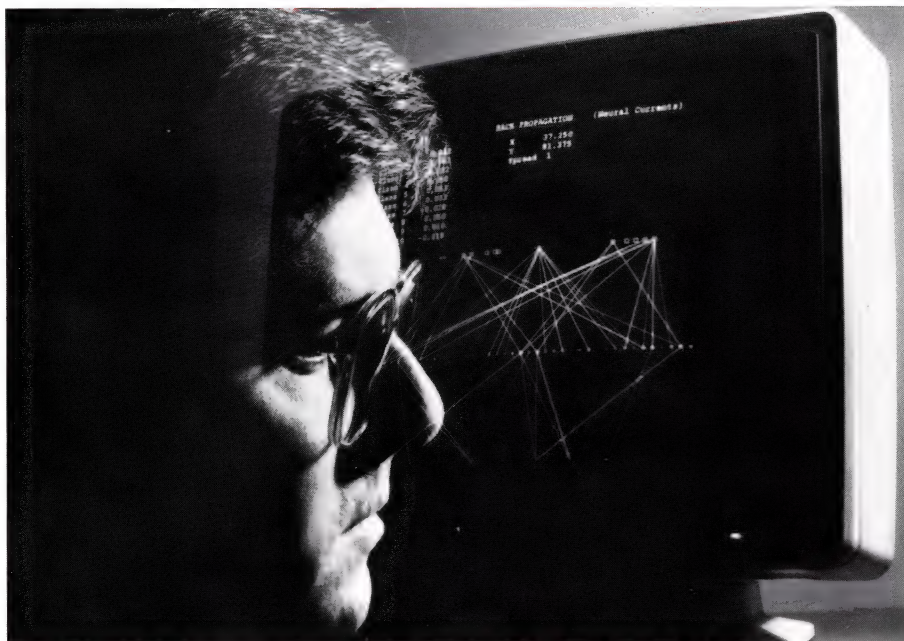
"The prototypes have demonstrated that a properly-designed aluminium wagon will perform as predicted," he said. "They are in general use in New Zealand and are performing to that country's expectations."

Mr Callaghan says obvious advantages are a reduction in gross mass per wagon or increased payload, as well as durability and corrosion-resistance.

He reports orders worth more than \$125 million for aluminium rail wagons lodged last year with Tarco a joint-venture company formed by Alcan Aluminium Limited and the Thrall Car Manufacturing Company in the United States of America.

These included the largest single order to date which was for 1,030 rail cars worth \$60 million. "The new market for aluminium in the USA looks very promising and should restore confidence in aluminium freight wagons for Australia," he said.

NEW PRODUCTS & PROCESSES



Railway crossings controlled by computer

British Rail (BR) has commissioned the software house SD Scicon of Fleet, southern England, to investigate whether an automatic vision system based on neural networks could help the railway worker to see whether a crossing is clear.

The neural network is a currently fashionable and promising technique that enables a computer system to act in much the same way as a human brain. Just like humans, it learns by example, and like the human brain it is made up of a large number of processing elements operating in parallel.

According to SD Scicon, neural networks are at their most powerful when applied to problems whose solution requires knowledge difficult to specify. As a result they are highly suitable for such tasks as pattern recognition which have so far eluded conventional algorithmic approaches to vision processing.

Neural networks operate in a very simple way. Unlike conventional approaches to pattern recognition, which require complicated

programming techniques and do not work too well anyway, neural networks learn to recognise objects and scenarios from repeated exposure to examples.

As the network analyses ever more data inputs it gradually learns more about the process until it can recognise almost any possible scenario.

Once trained, the system is said to be in recall mode. This means a video image of the level crossing can be entered into the system as a primary input. Using its knowledge base, the neural network then compares this picture with its memory of different situations to decide whether the crossing is clear or not.

For the level crossing monitor, as well as other neural network applications, training must be ongoing. If any part of the level crossing scene changes, the network must be told about it or else it will fail to recognise what is actually going on.

As Mr Hebden points out, BR will use the system in addition to, not instead of, training human operators. "BR is keen to emphasise that this system, if deployed, would be an aid to the operator in difficult situations such as when he is busy or if conditions are bad," he said.

Enquiries: SD Scicon, 127/147 Fleet Road, Fleet, Hampshire, United Kingdom, GU13 8FD.
Tel: +44 252 622171. □

Palift receives USA award

Palift, made by Victorian Company Safetech Pty Ltd was launched in the USA in 1988 by Safetech's joint venture partner, Southworth International as "Pallet Pal." One year later, it has won the prestigious US materials handling magazine *Plant Engineering's* Bronze Award for the best new materials handling product introduced to the American market in the previous twelve months.

The award was made as a result of a survey conducted among the readership of the journal. 1,400 units have been sold to date and Southworth forecast that sales will top US\$3 million for the current financial year.

Palift was conceived and developed by Safetech when one of its directors practised in an occupational health clinic in 1982.

Enquiries: Safetech Pty Ltd, 56 George Street, Moe, Victoria 3825.
Tel: (051) 27 4566.
Fax: (051) 27 4431. □

NSW new ticket offices

The NSW State Rail Authority has chosen the GKN Modular Buildings' Garrison range of fibreglass structures for fare evasion and ticket offices on the City Rail network.

One of the advantages of the Garrison building is its ability to be assembled in situ using modular components which can be conveniently carried down stairs and along narrow passages to what, for many other prefabricated buildings would be inaccessible locations.

The booths feature excellent security, with lock-up change drawers, roller shutters and change windows. Subways are notoriously cold in winter, so all the units are air-conditioned to ensure the comfort of employees. The sound damping characteristics of Garrison also contribute to a better working environment.

Enquiries: Ken Thomas GKN Modular Buildings.
Telephone (02) 688 4466. □

REVIEWS



Author John Kerr (left) and manager of Queensland Rail's new Historical Centre, Ipswich, Graham Carter, examine some archival material. The centre has 16,000 historical photographs most of which were taken before 1920.

Triumph of Narrow Gauge – A history of Queensland Railways

By John Kerr

Boolarong Publications. \$39.95

Generations of Visionaries

To commemorate their 125th Anniversary Queensland Railways commissioned established author John Kerr to produce a book on the history of Queensland's railway system. The first train ran in Queensland in 1865 – the system now exceeds 10,000 km, almost a quarter being electrified.

John Kerr has written several books on the sugar and mining industries, and on Queensland's regional history – as well as publications featuring Queensland Railways. With this background he became an admirable choice of author for this fine publication.

Triumph of Narrow Gauge explains where and why railways were built and details the combined effects of political manoeuvring and financial logistics on the railway system, from embryonic days to the present time. This book highlights the strengths and the

weaknesses of this geographically vast railway. It also records the effect of generations of visionaries in the development of a transport network fundamental to Queensland's development and prosperity.

In his foreword to the publication retired Commissioner Ralph Sheehy states:

"The history of Queensland Railways over the past one hundred and twenty five years would not be complete without proper recognition of contributions made by the thousands of railway men and women of all generations who built, maintained and operated the system over that time. They stand beside those early settlers with whom they shared isolation and harsh conditions, as pioneers of this state."

This comment encapsulates the spirit of *Triumph of Narrow Gauge* and the feeling which is endemic in the book.

Throughout the publication the history of Queensland Railways is covered in painstaking detail, indicative of the intense research undertaken by John Kerr; the historical black and white photographs are numerous and represent one of the finest collections to be assembled and published. These are blended with up-to-the-minute colour plates which tell the story of present day operations.

At \$39.95 *Triumph of Narrow Gauge* is particularly good value.

The book will appeal to those interested in history, to the railway enthusiast and to the reader whose interest lies in contemporary developments of the Queensland System.

Triumph of Narrow Gauge # A History of Queensland Railways by John Kerr. ISBN 0-86439-102-1. Published by:

Boolarong Publications,
12 Brookes Street,
Bowen Hill QLD 4006.

REVIEWS

New Zealand Railway Yarns

By Roy Sinclair

Grantham House Publishing. \$19.95

A raconteur of the unusual

Roy Sinclair, a journalist with the *The Press* in Christchurch, New Zealand, is an avid rail enthusiast and a very keen photographer. If the photographic subject just happens to be railways, so much the better.

He has compiled a book of 26 humorous or fascinating stories about the folklore of New Zealand's railways – anecdotal stories from many different sources which reflect the reminiscences and memories of an age now largely forgotten. This book should sell well for its nostalgic appeal, if for no other reason.

Roy Sinclair's literary style is similar to the author himself – he excels as a raconteur of the unusual.

This reviewer was captivated by one of Sinclair's shorter stories concerning a Maori gentleman who took a train from Auckland to Cambridge in 1911 – the return ticket was 1s 6d. Unfortunately while at Cambridge the passenger died. The deceased man's relatives wanted to bring the body back to Auckland using the return ticket. The railway system insisted on a fee of £1. The dead man's Maori relatives complained bitterly about the charge saying he was worth more dead than alive.

The book is illustrated generously with appropriate line sketches by Simon van der Sluijs. Some of the line illustrations are very good indeed. Others are reminiscent of the illustrations

used in ancient copies of *The Bulletin* and *Smith's Weekly*.

All in all *New Zealand Railway Yarns* is an excellent medium to while away an hour or two. Unlike a novel it can be picked up or out down at will. Good value for \$19.95. Available at railway specialist bookshops. *New Zealand Railway Yarns* by Roy Sinclair. Published by Grantham House Publishing, PO Box 17-256, Wellington, New Zealand. Price: A\$19.95 (approx.). □

JANE'S FACELIFT AT 31 YEARS

The latest edition, the thirty-first in fact, of *Jane's World Railways* is universally acknowledged as the most comprehensive guide available to the world's railway systems, to manufacturers of railway products, and to the massive infrastructure which supports rail services in all countries is an essential reference. (I came across it while browsing in the library – Editor.)

Information throughout this latest edition has been extensively updated, with an expanded manufacturers' section which includes powered and non-powered passenger vehicles as well as electric traction equipment. More than 1000 manufacturers are covered, as well as 350 railway systems and 158 rapid transit networks.

Australia's Railway Systems command 23 pages in Jane's,

including coverage of the Mt Newman, Hamersley and Robe River Systems.

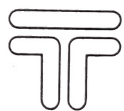
The information published in Jane's appears to be very accurate – at the time of Jane's deadline – and the Systems which comprise Railways of Australia are well represented. Up-to-date Australian illustrations include Australian National's five pack wagons and the new DL locomotives, Queensland Railways' "Spirit of Capricorn" and V/Line's G Class locomotives.

Australian locomotive manufacturers are effectively covered – the Clyde entry being by far the best presented. More effort has been made by Goninan's than in previous editions, and Walkers again disappoints with a paucity of data.

Overall the 1989-90 edition of *Jane's World Railways* is as authoritative as it is now expected to be, and a tribute to its editorial staff and publisher.

The export price of £100 will deter some purchasers – but major manufacturers and libraries will find the book without parallel. Copies are available directly from the publisher.

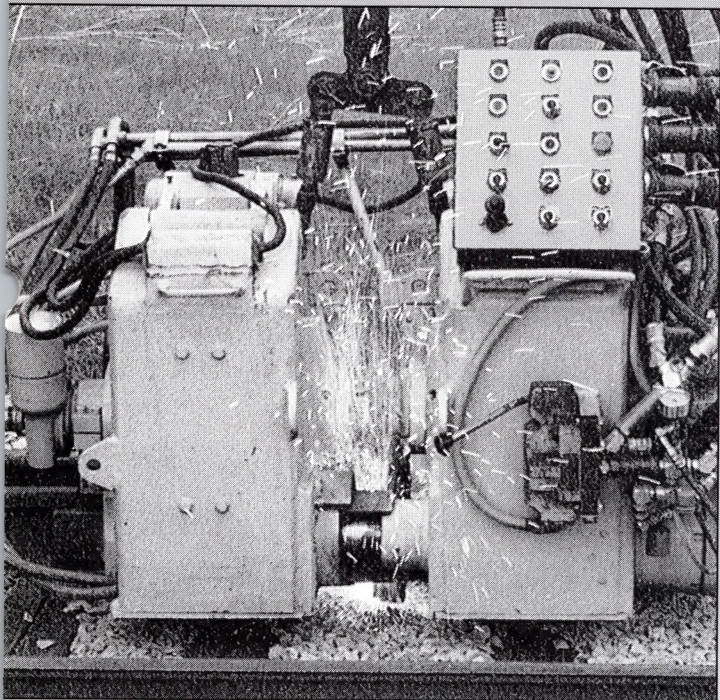
Jane's World Railways 1989-90
Edited by Geoffrey Freeman
Allen. Published by Jane's Transport Data, a division of Jane's Information Group Limited, 163 Brighton Road, Coulsdon, Surrey, CR3 2NX, United Kingdom.
ISBN 0710608918. □



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